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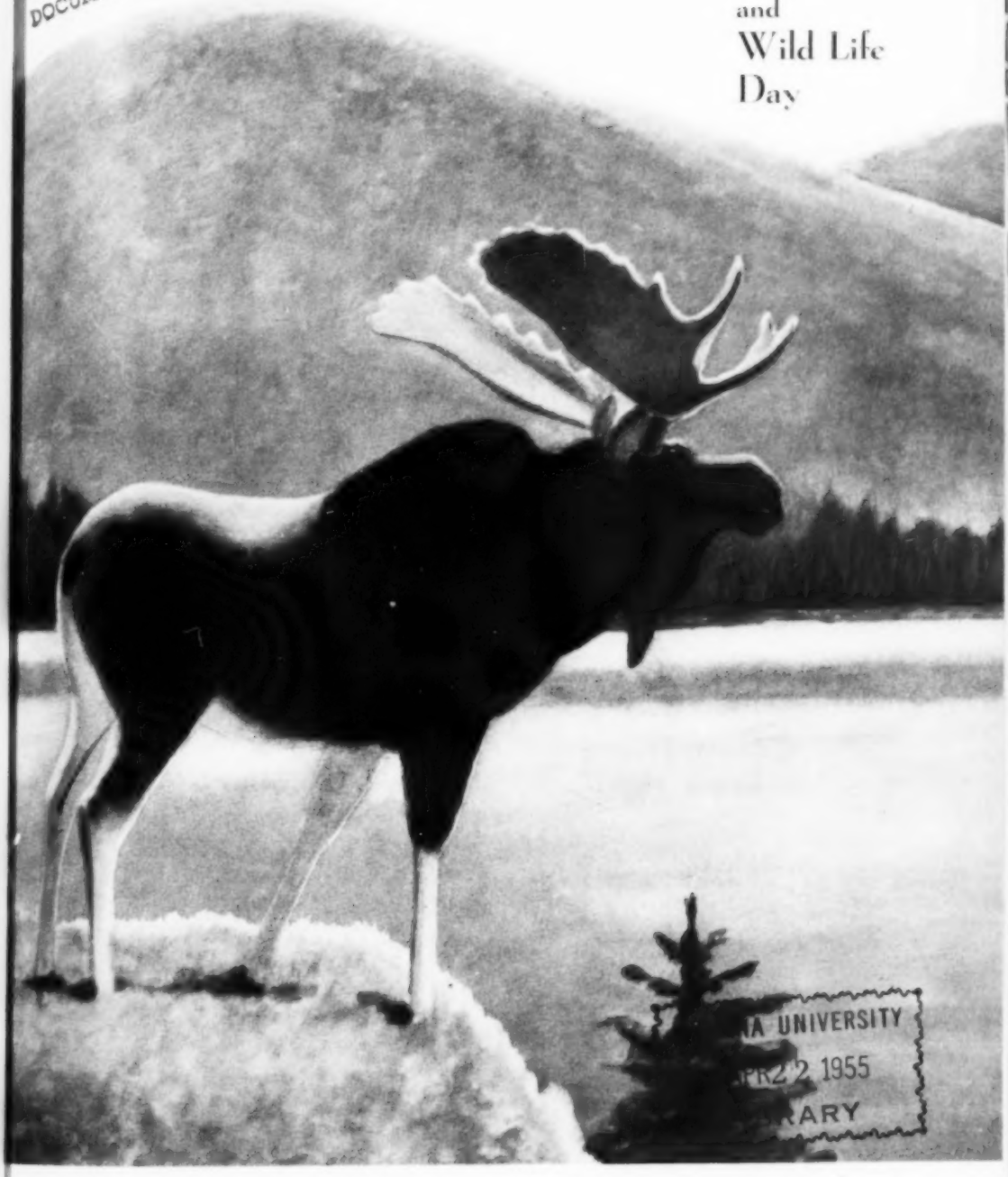
Arbor and Wild Life Day



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THE UNIVERSITY OF THE STATE OF NEW YORK

BULLETIN TO THE SCHOOLS

VOLUME 41 MARCH 1955 NUMBER 7

. . . Contents . . .

	PAGE
Arbor and Wild Life Day, *Lewis A. Wilson*	213
How Arbor Day Began, *Harold Palmer Piser*	215
Arbor Day Timetable	221
Avian Sweepstakes Immigrant, *E. M. Reilly jr*	223
Introducing Amphibians, *James A. Fowler*	226
Protecting the Air We Breathe, *P. W. Zimmerman*	231
An Antler Story, *Walter J. Schoonmaker*	236
Bird Invasion from the South, *Kenneth C. Parkes*	239
Matsucoccus Scale Threatens the Red Pine, *D. L. Collins*	244
A Public School Camping Program, *Louis F. Ismay*	248
The Maple and the Passenger Pigeon in Iroquois Indian Life, *William N. Fenton*	253
The Moose, Our Largest Deer, *Ralph S. Palmer*	Cover page 3

The Arbor and Wild Life Day number of the BULLETIN is the only one devoted annually to natural history and conservation interests.

. . .

COVER PICTURE: Bull Moose
From a painting by Ralph S. Palmer

THE UNIVERSITY OF THE STATE OF NEW YORK
BULLETIN TO THE SCHOOLS

Issued monthly during the school year by the State Education Department

CHARLES F. PROBES, *Editor* KATHLEEN L. CARMODY, *Assistant*

This bulletin is sent without charge to all schools and educational institutions of the State. To others it will be mailed postpaid for $1 a year. 10 cents for single copies.

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UNIVERSITY OF THE STATE OF NEW YORK PRESS

The University of the State of New York

Bulletin to the Schools

VOLUME 41 MARCH 1955 NUMBER 7

Arbor and Wild Life Day

PART OF OUR HERITAGE FROM THE EARLIEST SETTLERS OF OUR COUNTRY is an appreciation of nature. Since most of our Nation's work was once done in the open air, much of our country's early literature had the feel of the out-of-doors — of the windswept plains, the crisp atmosphere of the Appalachian barrier or the far ridges of the western mountains.

No other people have been so richly endowed by their Creator with a continent whose largess has seemed unlimited. Yet, by the mid-nineteenth century, cruel inroads had been made upon nature's bounty. Redress for the pillage of our resources has now come about through public demand for appropriate conservation laws. The setting aside of special days calling attention to the richness of our country's physical resources in field and forest, stream and nest, has done a great deal to remind us that there are generations yet to come for whom we must preserve these priceless aspects of life in America.

We are fortunate in New York State to have a great system of public parks, forest preserves and camp sites maintained for the enjoyment of all our people and made accessible to everyone by a network of highways. Thus even our urban population possesses an opportunity to vacation in the unspoiled woods, by lake or stream, on mountain height or at the ocean's shore. For our children especially this is an experience rich and rewarding.

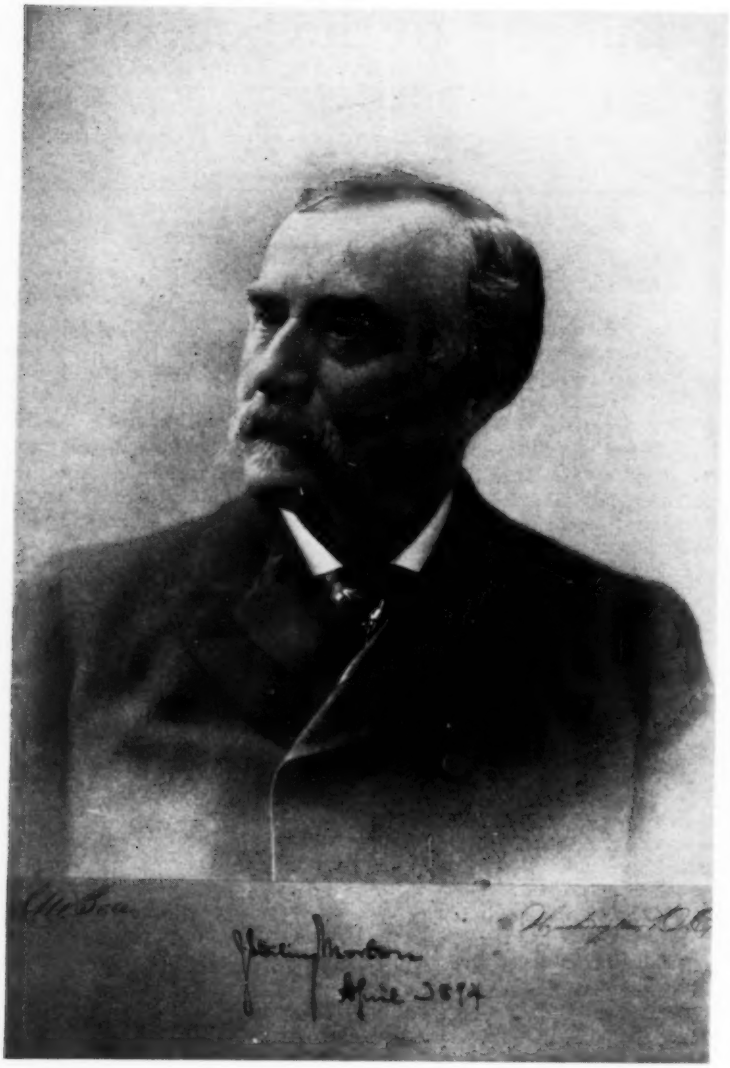
Schools today, with their courses in education for citizenship, conservation and agriculture, biology and nature study, do well to emphasize the role that each individual in our country can play in this great movement for the husbanding of our natural resources. Teachers can call attention to the memorable works in poetry, song and fiction that bespeak the enjoyment of the out-of-doors — those of Walt Whitman, Fenimore Cooper, Lowell, Longfellow or Thoreau, together with the balladry, folk song and Paul Bunyan tale native to America.

As teachers, let us determine that our children will grow in a love for the beauty of our country, realizing that nature's surface charm covers an undergirding of strength which assures the future of our Democracy.

Now, therefore, by virtue of my office as Commissioner of Education, and in accordance with the law, it is my privilege to designate April 22d as Bird Day, and April 29th, May 6th or May 13th, whichever best suits the convenience of each locality, as Arbor and Wild Life Day.

Lewis A. Wilson

Commissioner of Education



By permission, from J. Sterling Morton *by James C. Olson, University of Nebraska Press*

J. Sterling Morton, Founder of Arbor Day
1832–1902

How Arbor Day Began

"Other Holidays Repose upon the Past; Arbor Day Proposes for the Future" — J. Sterling Morton

HAROLD PALMER PISER
Flushing, New York

TREES ARE AN ETERNAL SYMBOL OF man's nobler feelings and aspirations. With other plants they form a living carpet holding the soil together, conserving water and adorning the earth.

In history, one man, J. Sterling Morton, was destined to give this form of life the importance and recognition it deserves. Morton, a former New Yorker, loved trees and labored long to encourage their planting, cultivation and care. He was inspired to institute a special day, which we all know as Arbor Day, to celebrate our love and need for them.

Morton has long since passed on, but his influence has been felt throughout the world. A beautiful statue of the founder of Arbor Day graces the Hall of Fame in Washington, D. C. Nebraska, the onetime virtually treeless plain which he labored to fill with beauty and bounty, has created a national shrine just outside Nebraska City to honor this man who found there his inspiration to establish Arbor Day on April 10, 1872.

President Theodore Roosevelt wrote an Arbor Day letter, dated April 15, 1907, to the school children of the Nation stating his belief in the absolute necessity of caring for and fostering our heritage of natural resources. President Harding, on April 22, 1922, issued a golden anniversary proclamation urging governors, officers of public instruction, civic and commercial bodies to continue their efforts to encourage the spirit and worth of Arbor Day. On April 22, 1932, the Federal Government issued a commemorative two-cent postage stamp to celebrate the sixtieth anniversary of the founding of Arbor Day and the one hundredth of the birth of its author.

In recent years the Food and Agriculture Organization of the United Nations has recognized the importance of Arbor Day as a vital force having a direct influence on conservation and the future welfare of mankind. A "World Festival of the Trees" is even now being planned through the efforts of the Honorable M. D. Chaturvedi of India, who introduced the following resolution at the Sixth Session of the Conference of the Food and Agriculture Organization of the United Nations in Rome, Italy, in 1951:

> The Conference
>
> Recognizing the need for mass consciousness of the aesthetic, physical, and economic value of trees,
>
> Recommends that a World Festival of the Trees be celebrated annually in each member country on a date suited to local conditions.

Our story now spirals back to the small village of Adams in Jefferson county in northern New York, a region garrisoned by hills covered with a wealth of forest trees and located about forty miles south of the Thousand Islands. The town was founded by settlers from New England who named it after President Adams, a Bostonian. It was here that Julius Dewey Morton opened a general store and soon after married Emeline Sterling. Julius

Courtesy of United States Forest Service

Statue of J. Sterling Morton, Hall of Fame, Washington, D. C.

Sterling Morton, the first of their three children, was born on April 22, 1832. Although the family did well here, rumors of the beauty and richness of the great Northwest Ordinance country led them to pack up and travel to Michigan, where they settled in Monroe on Lake Erie, not far from Detroit.

Young J. Sterling Morton attended the Wesleyan Seminary at Albion, Mich., for three years and from there entered the University of Michigan at Ann Arbor. Stories are recorded of his popularity, fun-loving nature and inclination to practical joking. After a rather stormy college career, he was awarded a bachelor of arts degree from the university and an honorary baccalaureate from Union College at Schenectady.

While at Wesleyan, Morton became engaged to a beautiful and charming girl, Caroline Joy French, when she was 14 and he 15. After finishing his education, he took employment as a reporter for the Detroit Free Press. From then on his interest in journalism never waned. He read many news stories and articles and discussed the adventurous happenings in the settlement of the Kansas-Nebraska territories. Caroline also was enthused about going there to live. With their parents' consent and blessing, they were married on October 30, 1854, and after the reception they left Detroit, bound for a new life together in the Territory of Nebraska.

Wending their way slowly west, the young settlers transferred from railroad to Missouri River packet and then to stagecoach, bravely accepting the hardships of the journey. They arrived at the now extinct town of Saint Marys, Iowa, stayed for a short time at Bellevue in a simple log cabin, and finally settled in Nebraska City, where Morton had bought a quarter section of government land for $1.25 an acre. A small frame house was built, the first shingled structure of the territory, which was eventually destined to become "Arbor Lodge."

Morton immediately began to move into the circles of the vital life around him. At the age of 22 he assumed editorial control of the Nebraska City News, then the only newspaper in the Nebraska Territory. He was consumed with interest in the people and the territory. Since he was accustomed to the green glory and abundance of the East, the thick forests and the rolling brush, this new land stretching unbroken and open, mile upon mile, seemed to beckon to him for development and cultivation. Other settlers from the East felt the same way. Morton gave voice to their wants and urged in editorial, speech and example the planting of ornamental and shade

trees, groves of forest and fruit trees and trees for windbreaks. The open plain soon began to produce trees.

Along with his editorial and planting activities, Morton's political fame began to rise. He became secretary of the Territory of Nebraska (1858–61) as well as acting governor (1858–59). A member of the State Board of Agriculture, he was elected its president in 1873 and became candidate for governor of the state in 1880, 1882, 1884 and 1892. President Grover Cleveland appointed him to his cabinet as Secretary of Agriculture, a position he held from 1893 to 1897.

Always he devoted much of his interest and time to planting trees, especially fruit trees. In 1869, the organization of the Nebraska State Horticultural Society gave fruit growers an opportunity to share experiences and pool knowledge at a time when very little scientific information about planting and growing was available. At a meeting of this society on January 4, 1872, Morton delivered his now famous "Fruit Address," one of his best on tree planting. At a meeting of the State Board of Agriculture, convened on the same day, he offered the following resolution:

> *Resolved*, That Wednesday, the 10th day of April, 1872, be, and the same is hereby, especially set apart and consecrated for tree planting in the State of Nebraska, and the State Board of Agriculture hereby name it Arbor Day; and to urge upon the people of the State the vital importance of tree planting, hereby offer a special premium of one hundred dollars to the agricultural society of that county in Nebraska which shall, upon that day, plant properly the largest number of trees; and a farm library of twenty-five dollars' worth of books to that person who, on that day, shall plant properly, in Nebraska, the greatest number of trees.

By permission, from J. Sterling Morton *by James C. Olson, University of Nebraska Press*

Morton's Birthplace in Adams, N. Y. The Morton House Still Stands Although Somewhat Altered in Appearance and Changed from Its Original Location.

The resolution was adopted without revision but not until J. Sterling Morton had emphasized that Arbor Day embraced not only forest trees, but all trees, including shade, ornamental and fruit. And so it was that Arbor Day began.

Over one million trees were planted in that state on the first Arbor Day, April 10, 1872. The idea had caught hold and it was no doubt the first and most successful effort at tree planting on such a grand scale. A week later Morton wrote the following philosophical letter to the Omaha Daily Herald which shows well his deep interest in trees and their relation to man.

> Trees grow in time. The poorest landowner in Nebraska has just as large a fortune, of time, secured to him, as has the richest. And the rain and sunshine and seasons will be his partners, just as genially and gently as they will be those of any millionaire, and will make the trees planted by the poor man grow just as grandly and beautifully as those planted by the opulent. . .
>
> There is no aristocracy in trees. They are not haughty. They will thrive near the humblest cabin, on our fertile prairies, just as well, and become just as refreshing to the eye and as fruitful as they will in the shadow of a king's palace.
>
> The wealthiest and most powerful potentate on earth cannot hire one to speed its growths or bear fruit before its time. There is a true triumph in the unswerving integrity and genuine democracy of trees, for they refuse to be influenced by money or social position and thus tower morally, as well as physically, high above Congressmen and many other patriots of this dollaring age.
>
> Then what infinite beauty and loveliness we can add to the pleasant plains of Nebraska by planting forest and fruit trees upon every swell of their voluptuous undulations and, in another short decade, make her the Orchard of the Union, the Sylvan queen of the Republic. . .
>
> A collection of inanimate marbles may, for a few years, preserve the name, and entry, and exit on this stage in life's short play. But how much more enduring are the animate trees of our own planting. They grow and self-perpetuate themselves, and shed yearly blessings on our race. Trees are the monuments I would have and in their yearly tribute of emerald foliage, variegated flowers and blushing fruit, I would find my most acceptable panegyric.
>
> Thus we come to a benediction on the institution of Arbor Day in Nebraska. May it become a joy forever, and its anniversary be perpetuated in the constantly increasing blessings which its faithful observance is absolutely certain to bestow. May all the people strive on that day to plant, in Nebraska, many, many trees, both forest and fruit. May the day and the observance thereof be cherished in every household in the State forever, and its name and fruits become as a shower of blessings to the long lines of generations who shall succeed us in the short, quick trip which all humanity must make, from the cradle to the grave.
>
> The cultivation of flowers and trees is the cultivation of the good, the beautiful, and the ennobling in man, and for one, I wish to see this culture become universal in the State.

In 1874, the Nebraska State Board of Agriculture passed a resolution establishing the annual observance of Arbor Day on the second Wednesday of each April. Robert W. Furnas, the governor, issued the first Arbor Day proclamation, and established a custom that has been followed by every governor of the state since that time. In 1885, the State Legislature set aside Morton's birthday, April 22d, as Arbor Day and proclaimed it a legal holiday. Once a practically treeless state — originally only 3 per cent of its area was covered with timber — Nebraska had become one of the leaders in practical forestry.

By permission, from J. Sterling Morton *by James C. Olson, University of Nebraska Press*

Arbor Lodge Today. In 1923, through the Generosity of His Eldest Son, Joy, J. Sterling Morton's Home and Grounds near Nebraska City Became Arbor Lodge State Park — 65 Acres of Woodland, Landscaped Gardens and a Colonial Mansion Visited by Thousands Yearly.

Arbor Day spread almost immediately to Kansas, Tennessee, Minnesota, then to North Dakota and Ohio. New York first observed it in 1889. Today, Arbor Day is observed in every state, either by legislative enactment or official proclamation. Most of our territories and dependencies and practically all foreign countries celebrate the meaning of the day in some manner or other, although the dates of observance vary considerably. In 1887 Ontario's educational system instituted Arbor Day on the first Friday in May and designated it a tree-and-flower-planting day. Spain in 1895 officially established the Arbor Day plan. Then in 1905 Hawaii embraced it, and it was soon adopted throughout the British Empire, France and Norway. Now practically every country has an " Arbor Day," an " Arbor and Wild Life Day," a " Tree Day," a " Day of the Trees," an " Arbor Week," a " Tree Holiday," a " Festival of the Trees," a " Greening Week," a " New Year's Day of the Trees," " Tree-loving Week," a " Reforestation Week," a " National Festival of Tree Planting " or a " Students' Afforestation Day," with minor variations in theme, but all for the purpose of impressing young and old alike with the importance of trees.

For the first ten years the Arbor Day plan was promoted by agricultural organizations in cooperation with the various state and territorial divisions, public institutions, civic bodies and individuals. At a forestry convention in Cincinnati in 1882, another development occurred. On the suggestion of Warren Higby, president of the Ohio Forestry Commission, Arbor Day celebrations entered the Ohio educational field, and by direction of Superintendent of Schools John B. Peaslee, school children took an active part in these ceremonies. The American Forestry Congress, meeting at St Paul,

Minn., in 1883, adopted a resolution recommending that Arbor Day be observed in the schools of every state. B. G. Northrop of Connecticut, speaking at a meeting of the National Education Association in 1884, offered a similar resolution and it, too, was adopted.

From these beginnings Arbor Day observances became a definite part of the educational program for schools. By instilling a love for trees, encouraging tree planting and stressing the interrelationships of soil, plants, water and wildlife, superintendents, principals and teachers now play an active and important role in imparting the Arbor Day message to the school children of the land. This message must be kept alive by constant reminder and the active participation of youth in meaningful projects both inside and outside of the classroom. The education of our adult population to an awareness of the Arbor Day message is likewise essential.

In Arbor Day educators have found a symbol by which all can be taught to know and love our natural heritage and to preserve and perpetuate it in the civic and constructive spirit so well exemplified by J. Sterling Morton. Considering the urgent need for an expanded conservation education program, let us foster and promote this memorable day. May it become the symbol of our faith in "peace and plenty" for the future.

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Cover Leaflets Available

Single copies of the colored cover picture of the moose, with descriptive account, are available in leaflet form from the Education Office of the New York State Museum, Albany. Single copies of last year's colored cover of the mountain lion can still be obtained.

Arbor Day Timetable

Alabama	*Usually first or second Friday in December. By Proclamation**
Arizona	*Friday after first of February. (Friday after first of April in 5 counties)*
Arkansas	*First Saturday in December*
California	*March 7th*
Colorado	*Third Friday in April*
Connecticut	*By Proclamation**
Delaware	*By Proclamation**
District of Columbia	*Third Friday in April. By Proclamation***
Florida	*Third Friday in January*
Georgia	*Third Friday in February*
Idaho	*Between April 1st and May 1st. Set by county school superintendents*
Illinois	*Last Friday in April*
Indiana	*Third Friday in April. By Proclamation**
Iowa	*Last week in April. By Proclamation**
Kansas	*By Proclamation**
Kentucky	*By Proclamation**
Louisiana	*January*
Maine	*Set by Governor and Council*
Maryland	*March. By Proclamation**
Massachusetts	*Last Friday in April. By Proclamation**
Michigan	*Late April. By Proclamation**
Minnesota	*By Proclamation**
Mississippi	*Friday after first Monday in December*
Missouri	*Friday after first Tuesday in April*
Montana	*Second Tuesday in May*
Nebraska	*April 22d*
Nevada	*Last Friday in April*
New Hampshire	*Late April or May. By Proclamation**
New Jersey	*Last Friday in April*
New Mexico	*Second Friday in March. By Proclamation**
New York	*Usually in April. By Proclamation****
North Carolina	*Friday after March 15th*
North Dakota	*First Friday in May*
Ohio	*Last Friday in April. Law. By Proclamation**
Oklahoma	*Friday after second Monday in March*
Oregon	*Second Friday in April east of Cascades* *Second Friday in February west of Cascades*
Pennsylvania	*April 9th plus another day in October. By Proclamation**
Rhode Island	*May 4th*
South Carolina	*First Friday in December*
South Dakota	*Last Friday in April*
Tennessee	*First Friday in March*
Texas	*Third Friday in January*
Utah	*April. By Proclamation**
Vermont	*Late April or May. By Proclamation**
Virginia	*Second Friday in March*
Washington	*April or early May. By Proclamation**
West Virginia	*Early April*
Wisconsin	*By Proclamation**
Wyoming	*By Proclamation**

* By Governor. ** By Commissioners. *** By Commissioner of Education.

Source: State Foresters, February 1954. Reproduced by permission from The Conservation Yearbook, 1954, edited by Erle Kauffman.

RANGE OF THE CATTLE EGRET

Avian Sweepstakes Immigrant

The African Cattle Egret Is a Recent Comer to the New World

E. M. REILLY JR
Senior Curator of Zoology
New York State Museum

SINCE MOST BIRDS POSSESS THE POWER of flight, it is surprising to many persons that the ranges of these mobile creatures are so restricted. Some kinds of birds are found only on one small island or on one small mountain range. Other species are almost world-wide in distribution, while still others are found to be local in distribution with wide unoccupied areas between the local colonies. The study of such distributional patterns and their causes among birds and other animals is known as the science of zoogeography.

Most modern zoogeographers have come to the conclusion that for millions of years the continents have been much as they are today and that no transoceanic bridges need be imagined just to explain present animal distribution. One theory proposed to explain the movement of an animal from one continent to another in the absence of land connections has been called the "sweepstakes route" by Dr G. G. Simpson of the American Museum of Natural History in New York City. It is so called because the animals participating have as much chance of success as the holder of a sweepstakes ticket has of winning the first prize. Each factor favoring the immigration raises the chances of its occurring, much as the purchase of more tickets in a sweepstakes event gives the owner of the tickets a better possibility of winning one of the prizes. Factors which can aid animal immigrants include favorable winds and ocean currents, freak storms and mobility of the animal.

Birds, being winged and therefore more mobile than most animals, might be said to have more "sweepstakes tickets" than other creatures. A bird's chances of successfully using this route also increase proportionately with its power of flight, stamina, adaptability to water environment and its propensity to wander. A species which by natural habit straggles outside its regular range between seasons is more apt to wander far afield colonizing new areas.

In 1937, Dr Emmet R. Blake of the Chicago Museum of Natural History collected an African cattle egret (*Bubulcus i. ibis*) in British Guiana. In 1943, another specimen was reported by William Phelps from central northern Venezuela. François Haverschmidt reported seeing a straggler near Paramaribo, Surinam, Dutch Guiana, in March 1946 and, in December of the same year, he saw flocks of these birds numbering up to 50 individuals. He found a roost of about 600 birds in February 1947. Clearly, the species was an established breeding bird of northern South America, at least in the Surinam area.

The cattle egret is a species well adapted to the sweepstakes route of intercontinental travel. It is an excellent flyer with considerable stamina; it is used to the water environment and is not afraid of venturing out over large bodies

Photograph by S. A. Grimes, from National Audubon Society

Young Cattle Egrets Photographed at Lake Okeechobee, Fla., June 13, 1953. Probably the First Nestlings of This Species Observed in North America.

of water; and, like many species of the heron family to which it belongs, it habitually wanders outside the normal breeding and wintering areas, especially right after the nesting season.

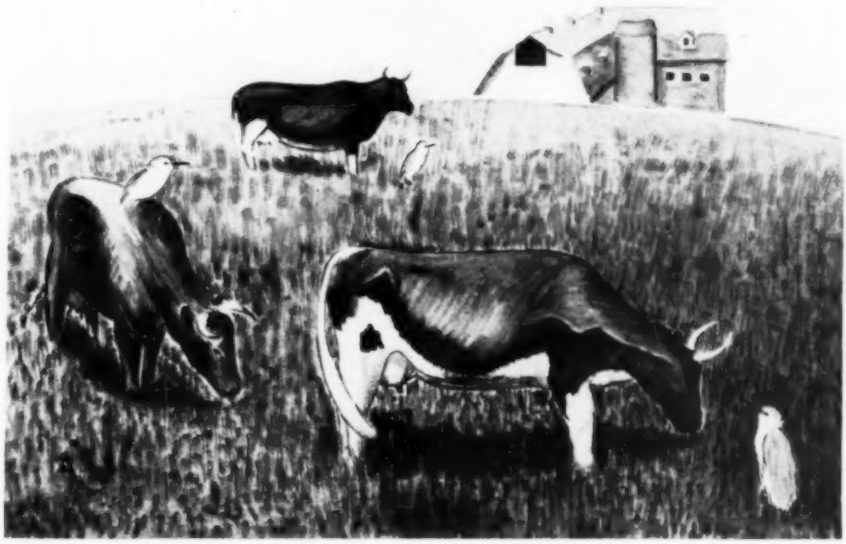
When first reported in British Guiana, all nearby zoos and aviaries were communicated with, since it was thought that the bird was an escaped cage bird. No escapees were reported and customs officials had no records of the species having been brought into the country. In addition, the specimen showed none of the usual conditions evident in the plumage and other parts of captive birds. The possibility of its being an escapee is not completely ruled out, but it is certain that more than one bird was necessary to start breeding and colonizing as the species did. Surely a large number of birds escaping from one zoo or aviary would be noticed.

The accompanying range map of the species shows that the nearest area from which the South American colony could have come was in southwestern Europe and northwestern Africa. The northeast trade winds blow fairly consistently from the region of northwestern Africa almost directly to the Guianas of northern South America. Such winds would greatly influence the course of any birds once they were out of sight of land *unless* there were a strong directional migratory instinct. South America is 1700 miles from Africa at the nearest point, but a more important factor than distance is the direction of the prevailing winds which would materially assist a flock of birds in a 3250-mile journey from Gibraltar to Guiana. It is even conceivable that the laws of chance might place a floating resting place in the nature of a boat or derelict at some point midway in the journey.

Other members of the heron family have been known to land and take off from bodies of water and, given a calm sea, the cattle egrets may have been able to rest on the ocean waters. Once in hundreds of years conditions would be just right for such an event, and it is likely these birds were able unwittingly to take advantage of them.

The species is spreading rapidly. In 1951, it was taken in Colombia west of the Andes; some time about 1950 it reached Florida, where it now breeds. In the leap to Florida it apparently skipped the Greater and Lesser Antilles. It will probably be found throughout these islands and has most likely been overlooked there since it is similar in appearance to many native herons and egrets. In 1952, one was collected in Massachusetts, another in Illinois, one in Maine and another in Bermuda. More than 100 wintered in Florida during 1952–53. Sight records of stragglers wandering about after the nesting season have come in from all along the Atlantic seaboard, including an unconfirmed report from Long Island in New York State.

It is a most fascinating addition to our bird fauna. The writer has watched cattle egrets walking sedately about the hoofs and heads of grazing water buffalo and cattle in central India and Siam — they even perch on the backs of these animals. In Africa they perch on the backs of hippopotamuses, rhinoceroses, elephants and other large game animals. The principal reason for this habit is apparently to garner the locusts and other insects stirred up by and attracted by the



Throughout Their Range Cattle Egrets Commonly Associate with Large Domestic Animals

large beasts. Throughout their range they associate with domestic animals; where large animals are scarce, they are found along river banks in company with other species of herons.

Since the students of birds know the various types of land which the cattle egret seems to prefer in the Old World, it is logical to assume that the species will spread through similar habitats in the Americas. In the short space of a decade the species may successfully occupy the suitable breeding territory in the New World as indicated on the map. It is a known wanderer and can be expected to straggle more or less regularly through the eastern United States.

The cattle egret has a light reddish-brown mantle and crown, light reddish legs and a dark brownish bill. At certain seasons its plumage is entirely white but, unlike the other herons and egrets with which it might be confused, it never has dark black legs and bill nor yellow on legs and bill. The American egret, which has a yellow bill and black legs, is sometimes associated with domestic cattle.

If you see any medium-sized white herons stalking about a New York pasture land with the domestic animals, take a good look. You might be seeing America's latest immigrant which arrived on the "sweepstakes route" from Africa via South America.

Introducing Amphibians

Breeding Habits of Some New York State Salamanders, Frogs and Toads

JAMES A. FOWLER
Director of Education
Academy of Natural Sciences of Philadelphia

SPRINGTIME AND SALAMANDERS—THIS phrase means little to the uninitiated but to herpetologists (naturalists who study amphibians and reptiles) it recalls memories of night collecting trips in drenching rains accompanied by near-freezing temperatures in early spring. But what are salamanders and why should they be of such interest?

Salamanders are amphibians, and amphibians are a "Jekyll and Hyde" group of cold-blooded, backboned animals, of which there are about 2500 living representatives. Amphibians were the first animals which, in the dim geological past, left the water to pioneer the land. Those which survive today are still only partly adapted to terrestrial life.

The 2500 different kinds of amphibians living today include about 2000 species of frogs and toads and over 200 species of salamanders. The remainder are caecilians. Frogs and toads are of world-wide occurrence except for the polar regions and smaller oceanic islands.

Photograph by Charles J. Stine jr

Typical Woodland Breeding Pond for Various Amphibians

Salamanders have a widespread distribution in the temperate and subtropical portions of Europe, Asia and America, penetrating only into the extreme northern parts of Africa. Caecilians are limbless, burrowing creatures and are confined to tropical and subtropical regions from central Mexico to South America, central Africa, India, Malaysia and the islands of Australasia. In New York State there are 31 kinds of amphibians, 14 kinds of frogs and toads and 17 kinds of salamanders, or about 1 per cent of the known kinds in the world.

Amphibians may be distinguished from other backboned animals with which they are sometimes confused by a number of characteristics, among which is their soft, moist, slimy skin, devoid of scales. They possess no claws or nails on their toes. Inasmuch as they are unable to prevent the loss of water through their skin, amphibians are either completely aquatic or confined to moist places on land.

The word *amphibian* means literally "double life" and alludes to the dual existence which typifies the lives of these transitional animals, most of which spend part of their life in the water and part of it on land. Most amphibians deposit gelatinous-covered eggs in the water. Gill-breathing young, known as larvae, hatch from these eggs. Following this aquatic stage in their development, most amphibians transform into air-breathing adults which either remain permanently aquatic or leave the water for a terrestrial habitat, returning only to mate and lay their eggs.

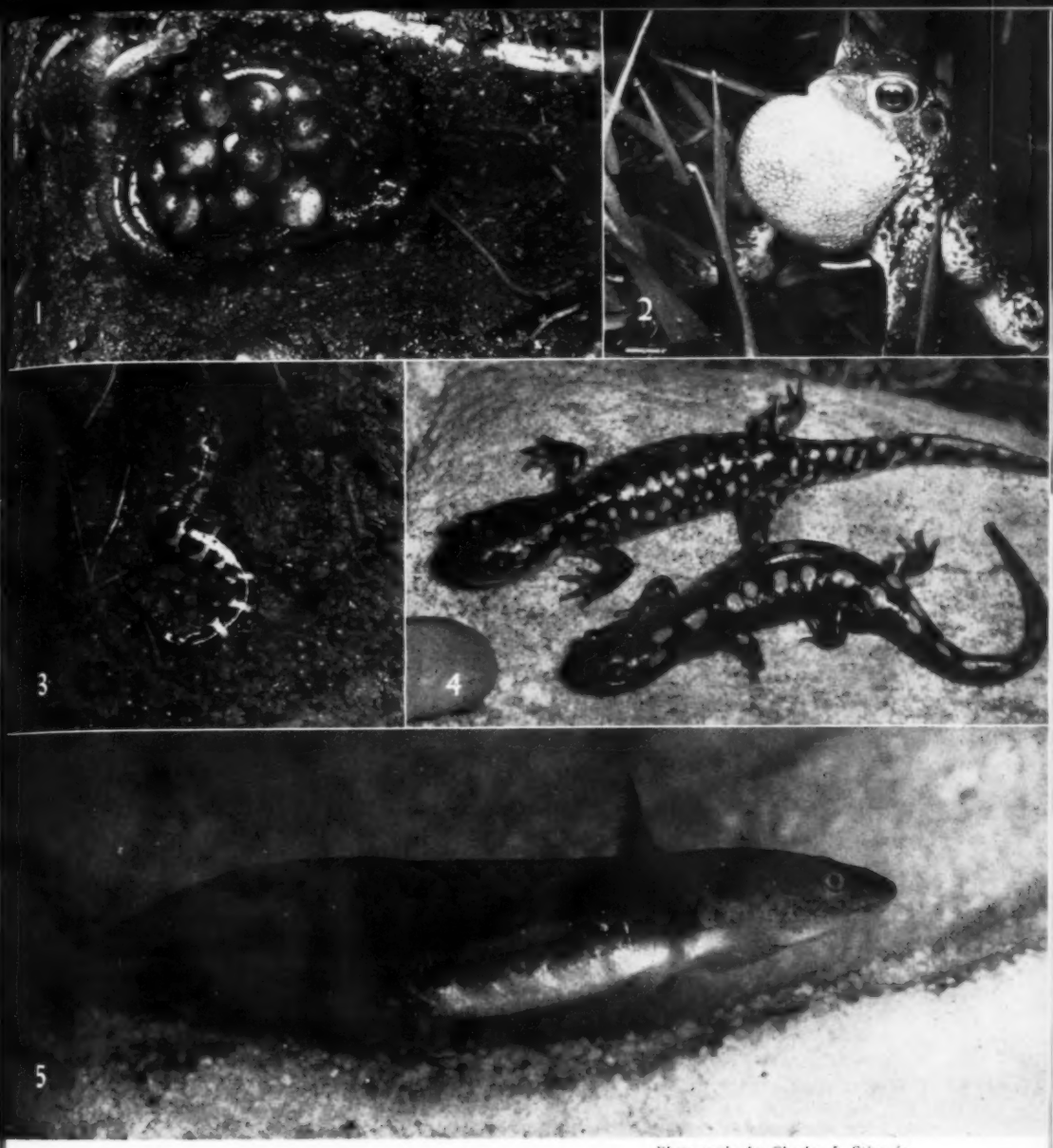
Some frogs and most salamanders of the family Plethodontidae (a family to which the majority of North American salamanders belong) are completely terrestrial even to the extent of laying their eggs on land in moist situations. The larval stage is passed within the egg capsules, and the young hatch fully formed. The red-backed salamander (*Plethodon cinereus*), a common woodland species in eastern North America, is a good example of this type of salamander. The eggs of this species are laid in a moist cavity, usually in a rotten log, from the roof of which the eggs are suspended like a bunch of grapes. Adult plethodontid salamanders are lungless and carry on respiration through the moist lining of their mouth and throat. Most other adult amphibians breathe by means of lungs, although there are some adult salamanders which never lose their gills.

Larval salamanders closely resemble the adults into which they eventually transform except for their smaller size and external gills. In some species, such as the mudpuppy (genus *Necturus*), the gills are retained throughout life. Such species are completely aquatic and permanently larval. The larvae of frogs and toads, on the other hand, are quite unlike the adult in appearance. At this stage they are known as " tadpoles " or " polliwogs." Frog and toad larvae when first hatched from the eggs have two distinct pairs of gills and an adhesive device by means of which they attach themselves to objects in the water. The adhesive device soon disappears and the gill region becomes overgrown by folds of skin. At metamorphosis, among other changes, the gills are replaced by lungs. In contrast to salamander larvae, most of which are carnivorous, frog and toad tadpoles are essentially herbivorous. As adults, frogs, toads and salamanders are carnivorous. The tail is resorbed in frogs and toads when they transform but persists in adult salamanders.

The larvae of frogs, toads and salamanders are very easily maintained in a balanced aquarium where their development and transformation may be readily observed. There is nothing more exciting and dramatic than to observe the development of an animal from egg to adult. Amphibian eggs are ideally suited to this purpose because of their availability and their large size, which makes it possible to watch the development with the naked eye. This development is even more remarkable when seen with a low-power microscope.

As " poikilothermal " (varying body temperature) animals, amphibians are generally more active and more often seen during the spring and summer months. Most of them hibernate in winter in northern latitudes but some salamanders are active the year round. Breeding, likewise, most frequently takes place during spring and early summer; in fact, some species such as the chorus frogs (genus *Pseudacris*) and the spring peeper (*Hyla crucifer*) are well-known harbingers of spring. The tiger salamander (*Ambystoma tigrinum*), on the other hand, anticipates spring by almost three months since it may breed as early as mid-January. Similarly, the wood frog (*Rana sylvatica*) frequently breeds in February. The bullfrog (*Rana catesbeiana*), by way of contrast, does not breed until June or July.

Associated with the breeding season of amphibians are the songs of the frogs and toads. The voices of frogs and toads are so distinctive that it is relatively easy to identify the different species by their songs alone. This method of identification has been made even easier by the publication of a record album of frog and



Photographs by Charles J. Stine jr

1 Dusky Salamander (*Desmognathus fuscus*) Coiled about Its Eggs
2 Singing Male American Toad (*Bufo terrestris americanus*)
3 Female Marbled Salamander (*Ambystoma opacum*) on Her "Nest"
4 (*Above*) Young Tiger Salamander (*Ambystoma tigrinum*)
(*Below*) Spotted Salamander (*Ambystoma maculatum*)
5 Salamander Larva (Enlarged). Note External Gills and Broad Tail Fin Which Are Lost at Transformation.

toad songs, "Voices of the Night," by Cornell University Press, Ithaca.

During the breeding season large numbers of singing males congregate at the breeding sites. They are soon joined by the essentially voiceless females which have been attracted by the songs of the males. The songs of frogs and toads are produced by forcing air over the vocal cords and into a resonating chamber consisting of a sac (or sacs) in the throat region. Salamanders, with but few exceptions, have no vocal cords.

Interestingly enough, experiments by Dr John A. Moore of Columbia University have shown that there is a distinct correlation between the breeding habits of amphibians, their geographic distribution, and the temperature tolerance and rates of development of their eggs.

The early breeding species are in general more northern in their distribution than those species which breed later. Northern species (or those which provide a "northern" environment for their eggs by breeding earlier in the season in the more southern parts of their range) deposit their eggs in a compact mass that is usually attached below the surface. This submerged mass is laid at a time of year when subsequent freezing of the surface waters is to be expected. Southern species (or those which provide a "southern" environment for their eggs by breeding later in the season in the more northern parts of their range) deposit their eggs in a surface film.

The egg size of northern species tends to be greater than in southern species and, as a corollary, the number of eggs is frequently smaller in northern than in southern species. Those species which breed when temperatures are low develop more rapidly than species breeding under warmer conditions. Northern species also have lower minimum and maximum limiting temperatures for normal development than southern species.

Applying the above conclusions to specific examples of familiar frogs, the wood frog (*Rana sylvatica*) occurs farther north than any of our eastern frogs. It breeds before any of its relatives (genus *Rana*) and its eggs are deposited in compact, globular masses attached below the surface of the water, the average temperature of which is 50° F. By way of contrast, the bullfrog (*Rana catesbeiana*) is the last member of the genus to breed. It has the least extensive distribution to the north of any of our eastern frogs and its eggs are deposited in a surface film.

There are many other ways too numerous to mention that amphibians have endeavored to adjust themselves to their environment, particularly as it relates to their life history. One of the most interesting of these is to breed in the fall. Among the "blunt-nosed" salamanders, technically the *Ambystoma,* is one, the marbled salamander (*Ambystoma opacum*), which, unlike most other amphibians, breeds in September and October. By so doing it avoids competition with such species as Jefferson's salamander (*Ambystoma jeffersonianum*) and the spotted salamander (*Ambystoma maculatum*), which are found in the same general region and which breed in the ponds in the spring.

The sites selected for egg-laying by the marbled salamander may be the beds of dry ponds and swamps or the margins of woodland streams which will later be under water. The eggs are laid in a little depression or cavity beneath some sort of protective cover. A single female may lay from 50 to 200 eggs, although the number is usually about 100. Hatching may take place in as little as 15 days after the eggs are laid. In the absence of rains, however, the unhatched eggs may survive the

winter and hatch the following spring when there is sufficient water for immersion. Larvae which hatch from eggs laid in the fall soon after they are deposited remain active in the water of the pond all winter.

The marbled salamander is found in New York in the lower Hudson valley from Greene county southward on the west side of the river, Westchester county on the east, Long Island and Staten Island. It is but one of a larger group of amphibians found in the State, most of which are generally distributed over eastern North America, and all of which comprise a fascinating group of animals to observe firsthand.

Protecting the Air We Breathe

Air Pollution, a Growing Problem with Increased Industrialization

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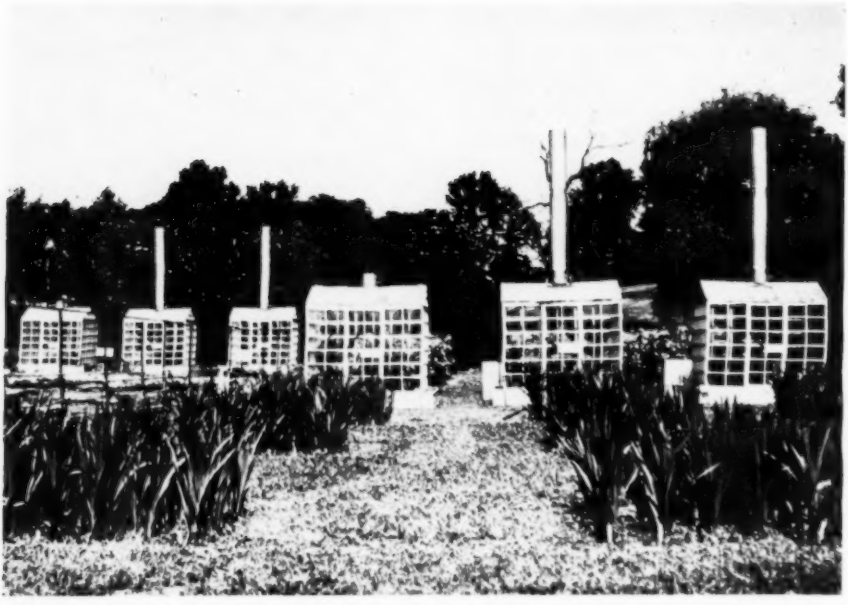
WE HAVE KNOWN FOR A LONG TIME about the dangers of contaminated food and water. Cities have gone to great lengths to safeguard their supplies of drinking water, milk, shellfish and other perishable foods. It is equally important in this day of increased industrialization to provide pure, safe air for people to breathe, but the problems associated are difficult to solve. Even crops and other vegetation may be damaged when exposed to impure air.

About 99 per cent of a relatively pure air sample, taken in the White mountains or 100 miles over the Atlantic, for example, is composed of nitrogen and oxygen at a ratio of four to one. In addition, there are several other chemicals like argon (nearly 1 per cent), carbon dioxide (0.03 per cent), helium, neon, hydrogen and traces of other rare elements. Any addition, like smoke, to this mixture would contaminate or pollute the air. Flue gases (from burning coal, oil etc.), automobile exhaust, smoke from burning trash, effluents from copper, iron and aluminum smelters, oil refineries, fertilizer factories and chemical manufacturing plants liberate sizable quantities of particulate matter and gases which pollute the air. Erupting volcanoes and decaying bodies are natural sources of air pollutants. There is a place in Alaska known as the Valley of Ten Thousand Smokes where natural air pollution occurs. The air of most places is always polluted to varying degrees. Actually air can be badly polluted without being poisonous or dangerous. The pollutants



Portable Plastic Greenhouses Used for Air Pollution Studies at Boyce Thompson Institute. The Houses Are Placed over Experimental Plots and the Plants Fumigated with Desired Concentrations of Gases.

can not be looked upon as poisons until present in abnormally large amounts.

Another very serious type of air pollutant was reported in a paper presented at a recent meeting of the American Chemical Society in New York City. Dr Paul Kotin of the University of Southern California stated that air sampling has revealed the presence of cancer-producing hydrocarbons in Los Angeles air. He found that skin cancers are produced when the skin of C57 strain of black mice is painted with material collected from Los Angeles air. Doctor Kotin believes that cancer-producing substances are hydrocarbons among which may be styrene, benzstyrene, benzine and xylene. Readers are familiar with the controversy now raging about the effect of coal tar products in cigarette smoke in relation to lung cancer.

Tons of hydrocarbons are emitted daily into the Los Angeles air from the operation of automobiles alone. Around the Los Angeles area, which has a topography conducive to smog formation, there are approximately 2,000,000 automobiles which burn daily some 12,000 tons of gasoline. Each car produces about 1000 cubic feet of dry exhaust per gallon of fuel burned. Many other operations also involve liberation of hydrocarbons in that same area.

Most of the air pollution problems around New York City come from burning oil and coal for fuel, oil refineries, the escape of gases from automobile exhaust and the burning of trash. Also, there are some industries within the city limits of New York which may emit special chemicals. New York City is fortunate in having a topography that is not conducive

to temperature inversion (meteorologically, a layer of warm air over cooler air at ground level) that would aid in formation of smog. This is in contrast to the Los Angeles area.

One of the best-known air pollutants arising from industrial operations is sulfur dioxide formed as a by-product in the smelting of ore for copper or iron. When the sulfur-containing rock is heated, sulfur dioxide is formed, often in large quantities, depending upon the nature of the operation. Plants are much more sensitive to this type of air pollutant than animals. One part of sulfur dioxide per million parts of air will injure the average plant in the course of eight hours. Guinea pigs can tolerate ten parts of sulfur dioxide per million parts of air indefinitely. The guinea pig is used as a test object instead of a human being because both are thought to be approximately equally sensitive. Sulfur dioxide was one of the first well-known toxic gases for plants. More than 30 years ago the Ducktown area of Tennessee was practically denuded by sulfur dioxide from the operation of a copper smelter in that area. All kinds of crops, forests and other vegetation were badly damaged. To solve this problem, flue gases were scrubbed and the sulfur was collected. A secondary result of this improved practice was the development of a new industry from the conserved by-products.

Within the past ten years, fluorine, which becomes hydrofluoric acid or silicon tetrafluoride when in the atmosphere, has come to be one of the most important effluents from the operation of aluminum smelters, steel smelters and phosphate fertilizer plants. Fluorine is one of the most toxic of all chemicals even in low concentrations. A few parts per billion of hydrofluoric acid gas in air damage gladioli and other sensitive species when fumigated for a few days. In addition to becoming marked by exposure to this gas, fluorine accumulates in tissue of forage crops. Though the gas is not toxic to animals when breathed in low concentrations, the accumulated fluorine in the forage causes fluorosis in young cattle, sheep and goats. This is a problem around a half dozen or more industries in the United States. There is no cure but it seldom is serious except in young animals which feed during the development of teeth and bones. It also affects milk production in dairy cows. Older animals are seldom affected but could be if the daily feed contained 100 parts per million of fluorine in the tissue.[1]

After it became known that hydrofluoric acid gas was toxic to plants and indirectly toxic to animals, the industrial plants were equipped with recovery machinery to reduce the effluent to a nontoxic level. It is neither possible nor

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[1] Some fluorine is required for development of sound teeth and bones. The pros and cons of fluoridation of drinking water have been aired in the newspapers in recent years, but the natural consumption of fluorine has been given very little attention. Actually, fluorine is one of the most common elements, and we are constantly associated with it, whether we know it or not. It is in the air, in soil and in food. The fluorides liberated into the atmosphere by many industrial operations are readily absorbed by the leaves of plants.

All trees, shrubs and vegetables absorb sizable quantities of fluorides, the leaves containing more than the tubers, roots or seeds. The best examples are the leaves of commercial tea and ornamental camellia. The latter stores as much as 2000 parts per million in the old tissue on a dry weight basis.

Young tea leaves (*Camellia sinensis*) tested in our laboratory vary around 100 parts per million (average of seven brands). When dry tea leaves are steeped in hot water for three minutes, approximately 85 per cent of the fluoride goes into solution. When prepared according to directions for consumption, tea contains approximately 2 parts of fluorine per million in contrast to treated drinking water which has but 1 part per million.

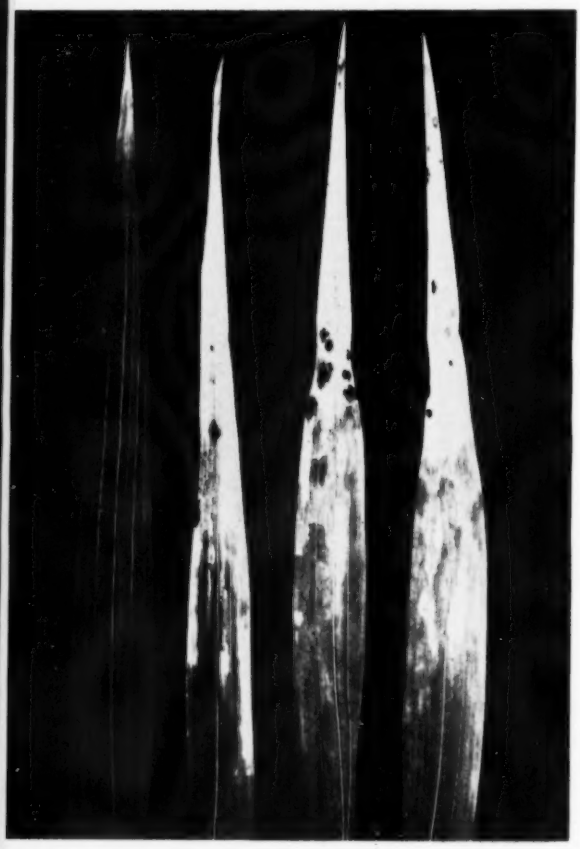
Leafy vegetables used for food vary from a few parts per million of fluorine up to 50 or more, depending upon the soil and surrounding air. Alfalfa used for animal feed contains from 15 to several hundred parts per million when grown in industrial areas.

necessary to prevent the escape of all fluorine since the smoking of a cigarette or the burning of a brush pile liberates fluorine which becomes hydrofluoric acid gas in the air. It is not considered a poison until the concentration becomes too great.

As a general rule, the ordinary air pollutants in the atmosphere do not constitute serious health hazards. Thus far, deaths have occurred only where smog was involved, and in these cases the affected persons were generally known to have had respiratory difficulties when the smog was not present. City residents are all aware of the eye and throat irritation and reduced visibility which are caused by air pollutants and smog. In recent years we have heard a great deal about smog in various parts of the United States. Last October Los Angeles suffered so severe a smog that it threatened to become a Los Angeles election issue.

Smog is not simply a shorthand way of saying air pollution. It is possible for a community to have an air pollution problem but never experience a smog. Smog is due to a combination of pollutants in the form of solid particles, liquid droplets and many invisible gases which can react with one another under the influence of sunlight to form various types of noxious products. Natural topography and climate are influencing factors, as well as particles of material, such as ash or chemicals, on which contaminants accumulate. Through the temperature inversion factor in valleys the contaminants become concentrated, endangering animals and also damaging crops. The best-known smog area in the United States is in the Los Angeles valley. The second is in Pennsylvania, north of Pittsburgh, where it is commonly spoken of as the Donora smog. New York and Detroit often have mild smogs.

The Los Angeles basin is formed by a sweep of mountains on three sides, while the ocean with its on-shore wind is on the fourth side. To the north and east these mountains are particularly high and are pierced by only a few widely separated and narrow passes. This provides a natural flow of air inland and



Gladiolus Leaves Showing Damaging Effect of Fumigation with Hydrofluoric Acid Gas. Untreated Control on Left with Natural Tip Burn; Other Leaves Exposed about Four Days to Less Than One Part Per Million of Hydrofluoric Acid Gas in the Air.

Effect of Sulfur Dioxide on Plants. (Above) Tomato Leaves Showing Control on Left and on Right Effect of Fumigation with About One Part of Sulfur Dioxide to One Million Parts of Air for Six Hours. (Below) Injury to Leaf from Castor Bean Plant Subjected to Same Exposure.

permits continual mixing and concentrating of the chemicals in the air by the temperature inversion factor.

There is a mass of warm air high over the Pacific ocean which settles over Los Angeles. In moving downward from the upper atmosphere, this air becomes compressed and thereby heated. When it finally arrives in a position low enough to contact the arc of the mountains around the basin, it is considerably warmer than air at ground level which has been cooled in its passage over the ocean. This temperature inversion factor aids in mixing the air and concentrating air pollutants on smog particles.

It is obvious that air pollution is a serious economic problem and the cause of many lawsuits. The best solution for air pollution problems comes about through the cooperation among industries, cities and agricultural groups. There are times when it is impossible for the industry to reduce the impurities to a point where most sensitive plant species can grow. In such cases the industry should advise the farmers on types of crops which can be safely grown. Where the farmer precedes the industry, he may wish to adhere to his rights, and the industry must make concessions. In such cases the industry may wish to continue to operate and pay for damages. It is generally possible to instal recovery equipment sufficient to reduce the toxic ingredients. Frequently the recovered material is very valuable and in some cases industries have profited by being forced to recover some of the impurities.

Until recently, smoking factory chimneys were regarded as a good index to American prosperity and growth. Now, through the installation of modern recovery equipment, it is possible to reduce the atmospheric pollution caused by their objectionable waste products. Industry can continue to operate at a profit without offending its neighbors. Industry is cooperating with the government and research institutions for the mutual benefit of all.

An Antler S

1 Each year, in late winter or early spring, the bony antlers of the whitetail buck are shed. They are seldom found because they are soon gnawed by rodents and covered with leaves and branches.

2 The dead antlers become loosened and fall off at the pedicle (outgrowth of the frontal bone of the skull) leaving round, raw and sore-looking spots. These are covered over quickly and the new antler growth begins in two to six weeks.

3 By March or early May red antler buds appear. These bulbous swellings, nourished with blood and protected by modified skin known as "velvet," speedily lengthen and begin to branch. In June or July the final stage of the antler pattern, which varies with the age and condition of the buck, is reached.

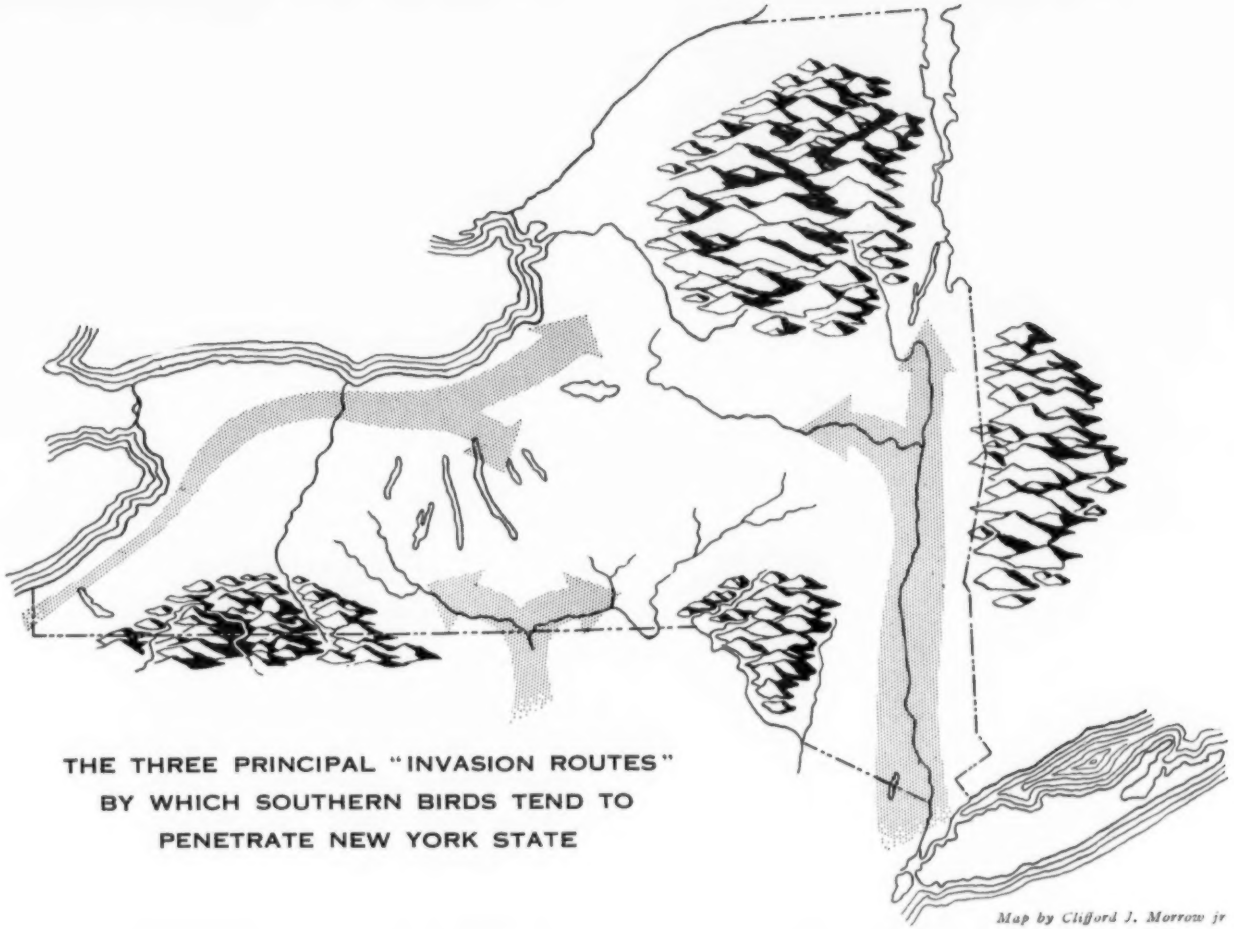
ntler Story

WALTER J. SCHOONMAKER
Museum Exhibits Planner
New York State Museum

4 By August the antlers are completely grown and hardened, although still in velvet. This fuzzy covering now dies, cracks and peels off in shreds. The buck polishes his antlers on saplings and brush.

5 In early October, when the forest is ablaze with color, the buck is fully armed with hard, spear-tipped antlers. They usually increase yearly in size and complexity until the buck reaches his prime, after which they gradually tend to become stunted.

6 During the fall mating period bucks often engage in battle. Usually the fight is a pushing contest and the results are seldom fatal. Occasionally, however, the antlers become so intricately entangled that they can not be separated and both deer then die from exhaustion and starvation.



THE THREE PRINCIPAL "INVASION ROUTES"
BY WHICH SOUTHERN BIRDS TEND TO
PENETRATE NEW YORK STATE

Map by Clifford J. Morrow jr

Bird Invasion from the South

Some Recent Changes in the Distribution of Our New York State Birds

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A STANDARD REFERENCE BOOK LIKE E. H. Eaton's Birds of New York can hardly be said to become obsolete the way today's newspaper or this week's magazine will. Certainly the descriptions and illustrations of birds and their nests and eggs are practically timeless. But when we come to the question of the distribution and abundance of the various kinds of birds within the State, we must expect obsolescence to begin the day the book appears. The physical appearance of a bird species changes only over periods of time familiar chiefly to geologists; the geographic distribution of a species may change radically in a very few years. An outstanding example of the latter is the cattle egret, described by Doctor Reilly elsewhere in this issue. As for New York birds, consider some of these statements made by Eaton in his Birds of New York (1909–14):

> The Black skimmer . . . is an occasional summer visitant off the shores of Long Island . . . (only six records known to Eaton).
>
> . . . on Lake Ontario . . . [the ring-billed gull] is sometimes fairly abundant as a spring migrant.
>
> . . . on Long Island [the gadwall] is considered only an accidental visitant.
>
> . . . [the pileated woodpecker] probably will never be reestablished in the State except in the larger evergreen forests of the Canadian zone.
>
> . . . [the evening grosbeak] must be considered as an occasional winter visitant in recent years, but usually in very small numbers, especially when the seed crop in the northwest has failed.

How different the New York status of these birds is today! The black skimmer has been nesting regularly on Long Island since 1934, the gadwall since 1947. A tremendous breeding colony of ring-billed gulls flourishes on an island in the eastern end of Lake Ontario. The pileated woodpecker may be seen regularly within a half-hour drive from New York City. The evening grosbeak is well established as a breeding bird of the Adirondacks and often lingers at feeding trays in central and western New York until May.

Many similar examples could be cited of birds whose distributional status in New York has changed markedly during the past 40 years. Most of the changes, happily, have been in the direction of increased abundance over a wider area. In a few cases the trend has been the other way; the bob-white and the red-headed woodpecker, for instance, have disappeared from much of their former range within the State. Several species that were extirpated from New York for many decades have now returned to the State as breeding birds, notably the wild turkey and the snowy egret.

As one looks over these changes which have taken place in New York during the past 30, 20 or even ten years, one notices certain definite trends appearing over and over again. Perhaps the most outstanding of these trends, and one which has caused no end of speculation, is the pronounced increase and spread within the

State of birds of a primarily southern distribution, the species thought to be typical of the so-called Carolinian Life Zone. This phenomenon has been taking place for a number of decades, but many people feel that it has been particularly accelerated in recent years. Each issue of Audubon Field Notes carries records of birds which have extended either their breeding or their wintering ranges toward the north. The states along the northeastern edge of the United States — Michigan, Ohio, Pennsylvania, New Jersey, New York and the New England states — have been especially notable for their recent invasion by southern birds.

In a few cases, this northward movement represents the reoccupation of a breeding range from which the species had been driven away, usually by the depredations of man. The snowy egret is a case in point. Eaton believed that it "undoubtedly bred in the Long Island swamps" in "early days," and small numbers summered on the island during the 1880's, although there is no definite record of a nest. By the earlier years of the twentieth century the plumage hunters had made such inroads into the egret population that this species was regarded as among the rarest of accidental visitors to New York. Through the efforts of the National Audubon Society and other conservation agencies, the egrets were saved from probable extermination, and they have made a remarkable recovery. By 1942, Cruickshank (Birds Around New York City, p. 70) was able to predict, "It is possible that another decade might see the Snowy Egret reestablishing itself as a breeding bird on Long Island." It took less than a decade for this event to take place; the first net was found at Oakbeach in the summer of 1949.

The American egret, like its smaller snowy relative, was saved from extermination by the passage of protective laws early in the twentieth century. Unlike the snowy egret, the larger species apparently never bred as far north as Long Island. Its northward progress has thus been somewhat slower. After having nested for several seasons at Sandy Hook in New Jersey, just beyond our borders, the American egret was finally found nesting in New York in 1953 at Fishers Island, off the eastern end of Long Island. Bird observers have been expecting these birds to nest in the heronry at the

Invaders from the South

1 ***The black skimmer has been nesting on Long Island since 1934***

2 ***The mockingbird nested in western New York in 1953 for the first time since the 1870's***

3 ***The tufted titmouse has invaded central New York by way of the Susquehanna route***

4 ***The blue-gray gnatcatcher has been nesting in Ithaca since 1948***

5 ***Saved from extinction by rigid protection, the American egret now nests as far north as Long Island and southern Ontario***

6 ***The turkey vulture is no longer confined to the Deep South***

Invaders from the South

Photographs by Arthur A. Allen

Montezuma marsh, since more and more of them appear there every spring, but thus far no nests have been found.

Pioneer among the southern herons in New York was the yellow-crowned night heron. This handsome species was once considered a rare visitor from the South, and only eight records had accumulated by 1923. More and more individuals appeared on Long Island from year to year, and two pairs finally nested at Massapequa in 1938. This heron has bred at several Long Island localities in subsequent years.

An even earlier arrival on Long Island among the invading southerners was the black skimmer. It had formerly bred along the southern coast of New Jersey, but its numbers apparently diminished toward the end of the nineteenth century. In the 1920's the New Jersey colonies began to increase in size and number, and new northern outposts were established. The first New York nests were found on Gilgo island, Great South bay, in 1934. There are now several colonies along the south shore of Long Island, and the black skimmer appears to be well established as a New York bird.

One of the most thoroughly documented northward invasions is that of the turkey vulture. Aaron M. Bagg and Henry M. Parker published a paper in 1951 (Auk, 68: 315–33) summarizing the advance of this species, with special emphasis on New England and eastern Canada. A summary of New York records is also presented. The first two vulture nests were found at opposite ends of the State, in Westchester county in 1925 and in Orleans county in 1927. Many residents of the northeastern states, knowing the "buzzard" by reputation as a bird of the Deep South, are quite surprised to learn the true identity of the large black birds seen soaring overhead in Pennsylvania, New York or New England.

Mention of the widely separated sites of the first two New York nests of the turkey vulture brings up an interesting subject, namely, the principal routes by which southern land birds have tended to invade our State. These are shown on the accompanying map. It is easy to understand the preference of southern birds for those parts of New York with the most amenable climate. Thus, they tend to avoid the higher altitudes, with their colder temperatures. The two primary routes into New York are the Hudson River valley and the lake plains of our two Great Lakes. A third route, followed by some species, enters the southern tier along the Susquehanna and its tributaries, between the Allegheny plateau on the west and the Catskills on the east. Although these are the main highways, so to speak, the southern immigrants tend to fan out in various directions as they become established. In due time the advancing frontier of invaders from two or three directions may meet, joining the arrows shown on the map.

An excellent example of one of our earlier southern immigrants which did just this is the rough-winged swallow. This is definitely a species of southern affinities, being found almost throughout Central and South America. Eaton (Birds of New York, v. 1, p. 24) published a map of the known New York breeding range in 1906 of the rough-winged swallow. A glance at this map will suffice to convince one that this species entered New York by all three of the routes indicated above, and that by 1906 these advancing populations had merged where they met.

Among the birds which have extended their New York breeding ranges in relatively recent years are the tufted titmouse, Carolina wren, blue-gray gnatcatcher, prothonotary warbler, blue-winged warbler, yellow-breasted chat,

cardinal, indigo bunting and Henslow's sparrow. The mockingbird, almost a symbol of the South, nested at East Bethany, Genesee county, in 1953; this is its first authentic breeding record for the State in the twentieth century, and one of only two such records known from the western half of the State.

A particularly interesting species in connection with a discussion of the spread of southern forms is the alder or Traill's flycatcher. This species has two subspecies, or geographic races, which are barely distinguishable in color when specimens are held side-by-side, but which are characterized by distinctive voices and nest-building habits. One of these is an inhabitant of the Canadian Zone, being common in the Adirondacks and Catskills and other cold areas of New York; the other is a bird of the warmer lowlands which has been invading the State along the two major routes, and has begun to penetrate the range of its northern cousin. Being members of the same species, these two forms are quite capable of interbreeding, and there is evidence that this is beginning to take place. This question is discussed more fully in a 1954 paper by the author (Wilson Bulletin, 66: 89–92).

The question inevitably arises as to the explanation behind these changes of range. The phenomenon is a real one; a number of southern bird species are definitely working their way northward. But when we try to interpret this move we enter the realm of speculation. The paper by Bagg and Parker on the turkey vulture, mentioned previously, lists some of the factors which have been suggested as contributing to the spread northward of that particular species. Some of these, such as the great recent increase in the deer population (hence increase in available carrion for vultures), are not applicable to southern birds in general. Three of their listed factors, however, are of wider scope, and are worth paraphrasing here:

1 The acknowledged warming of the climate in the northeastern region during the past several decades. This is the explanation most commonly advanced for the spread northward of southern birds, but it still leaves the climatic change itself to be explained.

2 An inherent vigor in the particular species which is currently in the process of extending its range. This explanation is given added weight by the fact that only certain of the southern species have displayed this northward tendency, and also by the fact that some species are moving in other directions (for example, the house wren and robin toward the south, the western meadowlark and Brewer's blackbird toward the east) in just as rapid a fashion.

3 The possibility that these Carolinian birds are what Spencer Trotter (Auk, 26: 231) called "laggards" in a general northward movement following the retreat of the glaciers from eastern North America. According to this theory, the ranges of our bird species are, at any given moment, at a temporary equilibrium, with various species accomplishing from time to time the adaptive adjustment which permits them to occupy a new area toward the north.

Of one thing we can be certain. No matter what the underlying cause of our current invasion by southern birds, we can be sure that no change, however slight, in the distribution of our New York birds will occur without being detected and duly recorded by our enthusiastic army of bird students!

Matsucoccus Scale Threatens Red Pine

Studies of a Newly Discovered Insect Pest

D. L. COLLINS
State Entomologist
New York State Science Service

IF THE MATSUCOCCUS SCALE WERE " just another insect " among the hundreds which occasionally cause trouble, we would not be giving it special attention in this BULLETIN. But this insect is of unusual interest for several reasons.

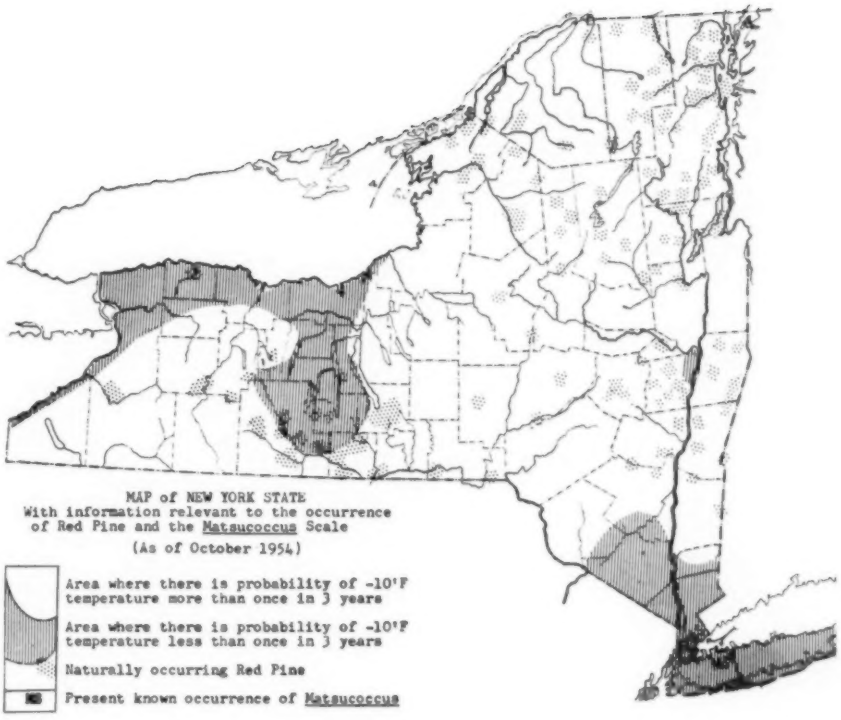
Its name alone is intriguing. If the word *Matsucoccus,* which is the name of the genus to which the insect has been assigned, sounds Japanese it is with good reason, since " matsu " means " pine " in Japanese. The name was first applied in Japan to certain scale insects which, incidentally, had been introduced from the United States. The particular *Matsucoccus* with which we are concerned here is a new species — so new, in fact, that at the time of this writing its official description, giving it a specific name, has not yet been published. Its life history, too, is not of the patterns commonly associated with the more conspicuous and better known insects. What makes it especially appropriate for discussion in this Arbor Day issue is the fact that it attacks and kills one of the most attractive and popular trees of New York State — the red pine.

Red pine is a native tree in New York State and grows on many types of soil. It can withstand drought and wind exposure and, until this scale came along, it was considered relatively free from serious insect pests. There are a number of fine natural stands of red pine in the State, especially in the central part of the Southern Tier, in the Adirondacks and in the central Hudson valley. In these same areas red pine has also been one of the most extensively planted reforestation trees, and there are now thousands of acres of red pine in such plantings. In addition, the red pine has often been planted as a specimen or ornamental tree and it is a favorite tree for water supply reservoir plantings. In view of the statewide usefulness and popularity of red pine, any disease or insect condition which threatens it gives cause for concern.

The *Matsucoccus* scale was first discovered and recognized as a new and serious pest in a planting of red pine beside a reservoir in Easton, Conn., in November 1946. A number of red pines in a plantation on the watershed of the Hemlocks reservoir were observed to have died suddenly, for no apparent reason, and others appeared to be dying. By 1950, 10 to 12 acres of trees had been killed.

Beneath the bark flakes on the twigs and at the base of the needles, on the dead and dying trees were found extremely small reddish colored saclike objects which proved to be a stage in the life cycle of a then unknown scale insect. This was subsequently determined as belonging to the genus *Matsucoccus.*

Most of us think of insects as having one of two kinds of development, either *complete* metamorphosis, like the butterflies and moths, with egg, caterpillar, pupa and adult forms, or *incomplete,* like the grasshopper, in which the early stages are


MAP of NEW YORK STATE
With information relevant to the occurrence
of Red Pine and the Matsucoccus Scale
(As of October 1954)
Area where there is probability of -10°F
temperature more than once in 3 years
Area where there is probability of -10°F
temperature less than once in 3 years
Naturally occurring Red Pine
Present known occurrence of Matsucoccus

Occurrence of Red Pine and Matsucoccus *Scale in New York*

Adapted from Reports of New York State Conservation Department, New York State Science Service and United States Weather Bureau.

like the adult stage except for size and the lack of wings. The *Matsucoccus* scale and other scales, however, have interesting complications in their life cycle.

In the active stage, during which dispersal takes place, they are known as "crawlers," a convenient term which avoids any commitment as to whether they are really larvae or nymphs. The *Matsucoccus* crawlers find a suitable place to hide under a bark scale on a twig or branch. There they insert their mouthparts into the plant tissue and settle down to a sedentary existence, doing nothing but sucking the plant juices. They pay the penalty of such an existence by losing their appendages and becoming bloated, gradually enlarging sacs. At the risk of making a rather unscientific comparison, we could call this the "shmoo" stage since more than anything else it now resembles Al Capp's famous characters from "Li'l Abner."

A term which has sometimes been applied to the end of this period is another noncommittal one, the "pre-adult," which again dodges the issue of whether it is a pupa or a disguised last-stage larva or nymph. It spends the winter in this pre-adult stage.

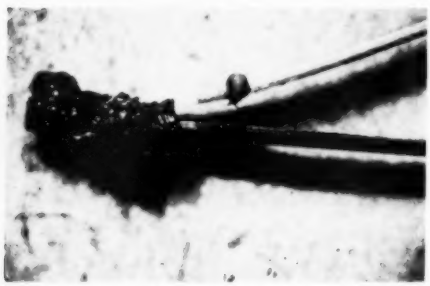
At this point another interesting departure from the ordinary takes place in

that if it is to become a female, it does so directly from the pre-adult stage by shedding its skin or molting. But if it is to become a male, its molt brings it out as an active creature which makes a cocoon and goes through a sort of pupal stage, during which wing pads and other characteristics of the adult male are visible. When the mature male eventually appears, it has legs and a well-developed pair of wings. It is slender and delicate, resembling a small gnat or midge.

The females (see illustration) are much larger than the males, and although they have legs, they never get wings. They remain fat and clumsy. They move about only enough to find a suitable place to lay their eggs, such as under a bark scale. The eggs hatch into the crawler stage, and the cycle begins all over again.

Both the cocoons and the egg coverings are composed of white, fluffy, waxy filaments, so that on a badly infested tree the branches appear as if covered with masses of cotton, especially on the lower sides near the points where they join the trunk. This cottony appearance is often the first evidence of the presence of the insect itself, although by then the tree has begun to show signs of disturbed nutrition and may be beyond saving.

A person who is on the watch for telltale symptoms of the presence of the scale might also see a lighter green color in the foliage on infested branches. The new growth not only shows this color effect first, but also becomes stunted. The foliage of the affected branches soon turns yellow and finally brick red. As more branches become affected the tree loses vigor rapidly and dies. Color changes of the type described are characteristic and should always be reported to the proper authorities, such as the agencies mentioned toward the end of this paper, so that the scale may be detected and identified.



Female Matsucoccus *Scale on Red Pine Needle (Near Center of Picture)*

Fortunately the scale appears to spread very slowly, and although it was first found in New York State in 1950 on Long Island and, later, along the Hutchinson River parkway in Westchester county, it has not yet been found north or west of Westchester county. The accompanying map shows its present known range in New York State. The map also shows where red pine occurs naturally in the State. It does not show the thousands of acres where it has been planted for reforestation nor does it show where it has been planted as an ornamental or "specimen" tree.

One favorable factor that might be operating to prevent spread or inhibit build-up is sometimes known as the "thermal barrier." In this case, this means that the insect might not be able to survive in the more rigorous upstate climate. Reference to the map shows that the majority of the surviving natural stands of red pine are located in the section where winter temperatures are expected to go to 10 degrees below zero (or colder) at least once in three years. The most extensive red pine reforestation plantings are also in these colder sections.

Before closing this brief account of the new threat to red pine, mention should be made of the research that is being

done on it. The significant point is not that many agencies are working on the problem, but rather that, without any "official" over-all direction, a coordinated program has been developed. The United States Forest Service Forest Insect Laboratory at New Haven, Conn., constituting a governmental agency which crosses state lines, acts as a sort of coordinator, besides carrying on its own work on the problem. In New York State, the Department of Conservation, which is in charge of reforestation projects, has personnel in the different forest districts which do the scouting and inspection necessary to determine whether the insect is present in any given region.

The New York State Department of Agriculture and Markets, which is charged with nursery inspection, has inspectors in the present infested areas who participate in the surveys and are on the alert for infestation in nurseries and on shipments of young trees for ornamental purposes.

The New York State Science Service, being a research agency, has assumed responsibility for coordinating the surveys, developing the techniques of inspection and suggesting experimental procedures.

The Boyce Thompson Institute for Plant Research in Yonkers and the State University of New York Agricultural and Technical Institute at Farmingdale, on Long Island, are both in the presently known infested area and therefore are strategically located for studies on biology and control. At the Boyce Thompson Institute, low-temperature studies and host-plant studies are under way. At Farmingdale, the New York State College of Agriculture, a State University unit at Cornell University, has a laboratory for research on pests of ornamentals. Here both the Farmingdale and Cornell groups, with the State Science Service and the United States Forest Service participating, are making control studies.

As might be inferred, control of the *Matsucoccus* scale presents unusual difficulties, especially where large trees and extensive plantings are involved. The fact that the spread of the *Matsucoccus* scale is slow may allow sufficient time for research to develop control measures before it has gone beyond the presently known infested areas. Knowledge of the biology of the insect is being developed so that the most vulnerable points in its life cycle and the best times to apply chemical controls can be determined. On the basis of the most recent experiments, fumigant type sprays and systemic sprays (sprays that achieve their effect through a lethal chemical which is absorbed into the sap stream of the tree and then taken up by the insect) at present appear to offer promise.

A Public School Camping Program

Week-end Camp Experiences Enrich Classroom Studies

LOUIS F. ISMAY
Fifth Grade Teacher
Nassau School
East Greenbush Central School District

SCHOOL CAMPING FOR TEN-YEAR-OLDS? Yes — and for eight, twelve and sixteen-year-olds, too, if camping fits into the classroom teacher's program. This is the philosophy and goal of the school camping committee of the East Greenbush Central School District. This committee is composed of administrators, teachers and one lay person from each of the district's geographic areas interested in school camping. The group was convened by Howard Goff, superintendent of schools for the East Greenbush Central School District.

Every classroom teacher who feels that firsthand observations, on-the-spot teaching, working, sharing and living together can best be served by school camping experiences need only ask and the camping committee will assist in setting up a program, providing resource persons and making administrative arrangements.

Because our school district does not yet have a camp of its own and the camping program at present operates on a limited budget, the camping committee first determines two things: (1) which fall and spring dates are available at the Rensselaer County 4–H Camp (which we have been using) and (2) how many classroom groups can be accommodated on our budget.

All teachers who feel that a camping experience would enrich their classroom programs are invited by the committee to discuss common philosophies and decide which classroom programs would benefit most by a week end at camp. Camping dates, which so far have included one school day and one nonschool day, are then assigned and the services of the committee are placed at the teacher's disposal.

The committee makes all administrative arrangements. It secures permission from the superintendent of schools and the director of elementary education, both of whom are members of the committee; notifies the board of education, cafeteria supervisor, health department head and elementary physical education personnel, and makes preliminary arrangements for bus transportation from the school to camp and return.

To the classroom teacher is given the task of preparing a camp program outline centered around class needs. The committee provides copies of previous programs as a guide, as well as a list of teachers and lay people who are qualified to assist in conducting specialized camp study groups. Teacher-pupil planning is a prerequisite for success.

Each teacher informs his pupils that they have been given the opportunity to continue the course of study in which they are particularly interested at camp, provided their parents approve. Each class then plans how best its program can be enriched by a camping experience and letters of invitation are usually written to the parents inviting them to attend a precamp meeting. Thus far, the class

From a Kodachrome by Howard L. Goff

Fifth Grade Class from Nassau School Studies Trees as Part of Its School Camping Program

camp programs have centered on a combination of the following: conservation, natural science and pioneer living.

Representatives of the committee and a member of the State Education Department, when one is available, meet with the parents of the children involved to discuss the aims of the school camping program. Colored movies and slides are shown of previous classes at camp and of teachers attending the Rensselaer County Conservation Workshops, as well as exhibits of children's camp projects. From the outset the fact is stressed that the camping program is an integral part of the class and school programs and not just an "extra."

A mimeographed list of questions and answers discussed at previous meetings is given to each parent, and opportunity is provided to ask additional questions. Price, transportation, supervision, program outline and learning experiences desired are thoroughly discussed.

No parent is forced to give permission for his child to attend. When the advantages of such a program are understood, permission is granted to 95 per cent of the children. During the time the class is at camp another class accepts the one or two children who have not been granted parental permission.

The class writes letters to invite experts to help with class planning. The school dietician helps plan a suitable camp menu. The school nurse is consulted on camp health practices. The school music supervisor, art supervisor and physical education personnel are invited to assist in their respective fields.

Most classes divide into committees for letter writing, filling in bus request forms,

making pupil duty rosters, compiling clothing and equipment lists, as well as listing skills the children need to master before camp, such as how to make bed rolls.

Two complete schedules are always planned — a regular outdoor program and an indoor rainy-day one. When the programs are completed and the children have helped to decide the specific subject areas they will study in natural science, conservation, pioneer living or the like, the teacher again meets with the camp committee to determine exactly what each leader will cover in the study groups.

In an attempt to provide opportunities for leadership training and to economize on camp costs so that we can provide for more groups, we are going to try an experiment this spring. We intend to use interested high school pupils as assistant group leaders. Although final arrangements have not been made, these pupils will probably come from the teacher-training group (those pupils who observe in sponsor teacher's classes to determine if they would like to prepare for the teaching profession).

We have found that the classroom teacher has more time to observe the children when not involved in leading a study group and until recently we did not schedule him or her as a group leader.

About two weeks before the class goes to camp each child takes home a duplicated form listing necessary clothing, time schedules, cost ($2 for four meals) and a recapitulation of the program. The bottom of the sheet is a returnable permission slip.

Each child is assigned by a student committee to a group, usually four groups in a class, six to eight children in each group. This insures each child the opportunity to take part in all phases of the camp program. Two excerpts from a class-planned program will illustrate this.

October 11, 1954

Lunch — Group D.....Waiters
Group A.....Cooks
Group B.....Dish Washers

Dinner — Group C.....Waiters
Group D.....Cooks
Group A.....Dish Washers

October 12, 1954

Breakfast — Group B.....Waiters
Group C.....Cooks
Group D.....Dish Washers

Lunch — Group A.....Waiters
Group B.....Cooks
Group C.....Dish Washers

* * *

9-10.30 *Tree Identification*
Groups A and B
Leader, Mr Sutherland
Edible Plant Hike
Groups C and D
Leader, Mr Burland

10.30-12 Groups change leaders and study areas.

Classes meet at school as usual the morning they are to leave and there board the school bus for the trip to camp. Upon arrival, each group has specific tasks: flag raising which everyone attends, storing art materials, carrying food to the kitchen, helping to unload the bus and placing baggage in piles. Time is provided for the children to stow their gear and get acquainted with the camp — the latter usually through a scavenger hunt or a mapping lesson. The program of study groups gets under way immediately following lunch the first day.

After each group is dismissed for another activity, after each meal and after taps in the evening, group leaders meet with the classroom teacher and committee chairman for an evaluation. This system enables the leaders and committee

members to keep a constant check on the proceedings.

Before the children reluctantly leave for home, they are asked for their reaction to camp. They are asked again the next day at school and again about a week later. Parents are asked to evaluate the program through a questionnaire, and the classroom teacher meets with the camping committee, usually within two weeks, for another evaluation.

Teachers have found that the children retained almost all their camp learnings and used them many times in succeeding months. These are a few of the numerous incidents that have been observed.

A large boy gained class recognition and approval when he became proficient in making wooden whistles — a skill learned during a tree identification class.

Two fifth grade girls have become so interested in nature that they take weekly hikes of two or three miles to identify trees, birds' nests, animal tracks and edible wild plants — skills learned at camp.

A fifth grade boy won class praise by assembling an exhibit showing how to make spruce gum — a skill learned while on an edible wild plant hike. A girl received much-needed recognition by volunteering to remain after school to write a description of this exhibit.

A boy who had been interested in birds for years became so enthusiastic that he organized a bird club of several other boys, all of whom had attended a bird hike at camp.

For some, it is the first time away from home and for others, it is the first time they have used tools. The boys who used antique tools to make a replica of a three-legged colonial chair will vouch for that. For all, it is a new, exciting experience.

The informality of camp life encourages the making of new friends, even while washing dishes. Sitting next to a casual friend while sketching a scene or while singing songs before a blazing campfire does much to transform a class into a more friendly, cooperative group.

Our camping program has recently expanded to such an extent that we are experimenting with three additional measures in an effort to determine the most economical methods and the most efficient use of personnel.

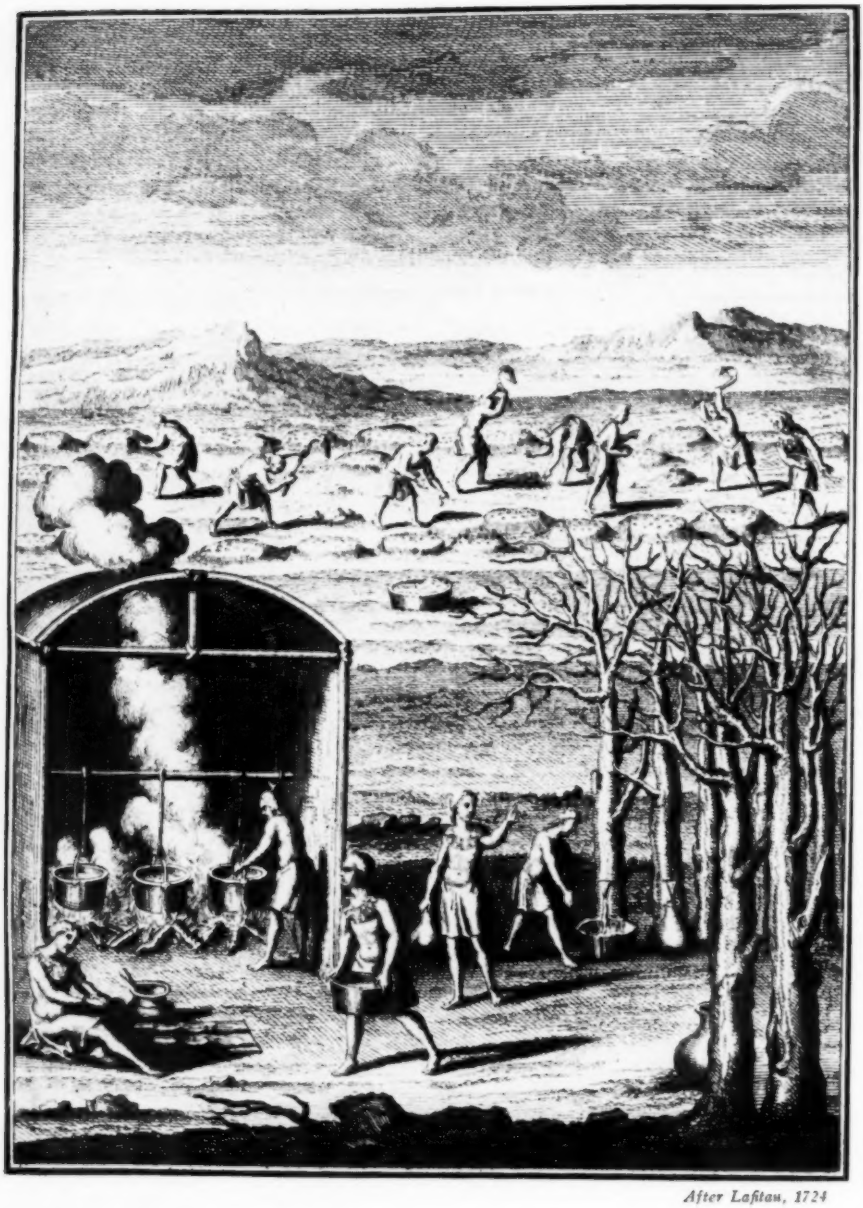
1 We are scheduling more than one class at a time.

2 We are scheduling camp days entirely within the school week.

3 We are now scheduling the classroom teacher as a leader of a study group during each study period.

Our future camping experiences will be guided by the results of an evaluation of these measures in terms of the over-all program.

The future of public school camping looks bright. As more and more teachers discover the values of school camping, schools in other areas may wish to develop similar programs. Our school camping committee will be glad to share with such schools the benefits of our experience in this field.



After Lafitau, 1724

Mohawk Women Sugaring at Caughnawaga near Montreal. Note That They Are Attired for a Much Warmer Activity.

The Maple and the Passenger Pigeon in Iroquois Indian Life

WILLIAM N. FENTON
Assistant Commissioner for New York State Museum and Science Service

THE RISE OF THE MAPLE SAP AND THE flight of the passenger pigeon were sure signs to the Iroquois Indians of New York that spring was on its way. We don't know when the Five Nations of Iroquois Indians — Mohawk, Oneida, Onondaga, Cayuga and Seneca — began to tap the maple tree to boil the sap into sugar, for sugar making is not described by the earliest writers, but we do know that the sugar maple (*Acer saccharum*) was native to the area and occupied a prominent place in the folklore of the Indians; and the bones of passenger pigeons (*Ectopistes migratorius*) appear abundantly from archeological sites of the prehistoric period. Not one of the very early observers who visited the lower Great Lakes area noted that Indians made maple sugar; but by the beginning of the eighteenth century descriptions of maple sugar making by the Indians commence and some observers who knew the Indians best believed that they had discovered maple sugar long before Europeans came to America. Both Father Lafitau, the Jesuit ethnologist, and Peter Kalm, the Swedish botanist, described sugar making in detail and held that it was aboriginal.

Since Lafitau's *Moeurs des Sauvages Ameriquains* (Paris, 1724, 2 vols.) is among the rarest of books on Indian customs, let us read what he writes of the Mohawk maple harvest at Caughnawaga near Montreal during the first quarter of the eighteenth century.

> In the month of March when the sun has gained a little strength and the trees begin to circulate sap Indian women make transverse incisions with the ax on the trunks of these trees from which there flows in abundance a liquid which they collect in great bark vessels. They then boil this liquid on the fire which consumes all the water and thickens the rest to the consistency of syrup, or even a loaf sugar, according to the degree and quantity of heat which they wish to give it. There is no mystery in it. This sugar is very healing, admirable for medicine but, although it is more healthful than that of the cane, it has not its charm or delicacy and almost always has a little burned taste. The French work it a little better than the Indian women, from whom they learned to make it, but they have not yet succeeded in whitening and refining it.

Charlevoix, another Jesuit historian of the time, was equally positive that the savages did not know how to make sugar of the syrup before they were taught by the French. Whatever the merits of this controversy, we are certain how the New York Indians felt about the sugar maple in later times.

The sugar maple was held in veneration. Even the American elm, from which the Iroquois made bark houses, sap buckets and most of their other utensils, did not have a festival. Early in the spring before the sap comes up the Seneca people would gather in their meeting house to give thanks to the forest and particularly to the maple. When the people had assembled one of the older

Seneca Sap Tub of Elm Bark. Presumably Collected in 1849 for the Indian Collection of the New York Cabinet of Natural History and Antiquities by Lewis H. Morgan of Rochester.

men would return thanks to all the spirit-forces from the earth to Heaven and particularly to the maple for its sweet water, and then they would go out where the maple tree stands and build a little fire and in it sprinkle the sacred Indian tobacco (*Nicotiana rustica*).

So now the smoke arises from the sacred tobacco.

Now then, all of you listen whom we call wah'da', *maple*. We now pray that you will fulfill the purpose for which you were appointed and that you will help the people, all of them who survive. It was this that our Maker intended when he created us that you would feel disposed to help all of us people, such of us as survive.

This is why you will feel like using all of your power to accomplish what our Maker intended. So now then, we who sit around this little fire pray that your power will be sufficient to carry out his intentions, to accomplish what you indeed have in mind, which is the responsibility of you maples who tower here on this earth.

So now then we have done the proper thing: we have gathered our voices together to give thanks through this smoke which arises from the sacred tobacco, so that you may hear; and in this way we make it apparent how thankful we really are that the maple stands here ready to give sap again to the people, you who stand here on the surface of this earth.

So that is all.

Such was the prayer that was said long ago among the Senecas living along Plank road on Cattaraugus reservation in the boyhood of John Jimmerson, my Seneca informant. Though the Senecas of Allegany and Cattaraugus reservations have long since abandoned the maple festival, it is still celebrated at Tonawanda Longhouse, or was 20 years ago.

Charles Blackchief, then 81, remembered that in his boyhood the west end of the reserve was covered with maple trees. Each man had about 100 trees. He would take an ax and blaze the limits of his grove, marking his territory in the Nation's woods. A man did not own the land; he merely possessed the right to tap the trees within his blazing. There were then 12 shanties in the woods where they boiled the sap and kept the fires going day and night. They selected trees which a man could barely put his arm about and tapped them four times. The tree was notched with an ax and a small wooden spout was driven into the incision; and before they had spouts they cut a notch in the tree about waist high and drove in a grooved slab, slashing the trunk obliquely on either side of the spout so that the sap would run down. The sap was caught in troughs made of elm bark folded in and bound up with withes of inner basswood bark. Each man had a store of these which he made the previous June, when elm bark peeled readily, in anticipation of next sugar season.

Before they gathered in the sap they would fell a 16-foot log and hew it out to make a trough. They emptied the bark troughs into bark pails or wooden bowls and poured from them into the wooden trough. Sap dishes were sometimes

carved of split cucumber wood blocks but elm bark bowls were much more common and known earlier. After 1800, sap was boiled in iron kettles, hung from horse chestnut posts over a hot fire. Pot hooks were made of beech or hickory and the hanger was a withe of hickory bark. Chief John Jacobs told me at Quaker Bridge:

> The fire should be a slow one. When the sap boils up too fast and threatens to overflow, add a little more sap to keep the syrup down. It takes all day to boil the sap down to sugar. The stirring paddle has a long handle so that the attendant may stand far away from fire and smoke. There is a heart-shaped hole in the blade for threading the sap; when the sap begins to string through the hole, it is reaching the sugar stage.

When the sap had been boiled to syrup, then the people gathered at the longhouse for the Sap Dance proper. This I witnessed on March 30, 1935, with Carl Carmer, who used my journal in writing his Listen for a Lonesome Drum.

The Faithkeepers held two preliminary meetings to assure each other that the community stood ready to go through with the ceremony of boiling the sap. Officials were appointed to solicit funds and food, and women were appointed to cook. When agreement had been reached, one of the old longhouse leaders stood and said, "The Keepers of the Faith and all of the people, even the little children, have gathered their opinions together in this meeting. They are now of one mind and are ready to send up their smoke to the maple."

By the day of the Feast of Thanksgiving to the Forest, sap buckets, cans, jars, milk bottles and oil tins had been hanging from wooden spigots driven into the maple trees for the past two weeks. People were boiling sap. Charles Blackchief, long since a deserter from the ranks of the longhouse supporters, had donated 15 quarts of white corn for the mush. Lady longhouse officers were pounding white corn to flour in wooden mortars and sifting out the chaff in winnowing baskets. By 4 o'clock the fires had been kindled under the kettles which hung from trammel irons in the fireplace of the cookhouse north of the Tonawanda Longhouse. Water was boiling and a woman attended the fires, while outside, boys were practicing at throwing and catching a lacrosse ball. Near the fire stood a sack of pounded flour which hunters and warriors carried when they journeyed. This flour stirred into the water makes a nourishing gruel or it may be taken dry on the run and washed down with a little water.

I came back to the longhouse at 7. The fires had been kindled and the newly acquired gas lanterns illuminated the hall. But few people had gathered at the appointed hour; a few women occupied the north end of the building and the men and chiefs sat to the south.

A half hour passed before Chief Lyman Johnson arose, removed his hat and addressed the assembly. Briefly, he announced that they had gathered to thank the Creator-of-our-lives for the maple tree, that once more the sap had risen and flowed to sweeten the food which sustains man. Then he proceeded to return thanks as always to all the spirit forces on the earth and upward through the pantheon to the sky — the people; the running streams, the brooks, lakes; weeds, shrubs, poles, timber, including the maple tree; the game, the birds, the food products; the sun, the moon and the stars; and the four cardinal directions; the prophet Handsome Lake, and the Creator himself. Then he announced that once more the people had gathered to celebrate the arrival of the maple sap and that momentarily "Twenty Pails" would burn

tobacco outside the longhouse for the maples.

Twenty Pails got up and, accompanied by the speaker, started for the door. An attendant meanwhile shoveled a heap of burning embers into a brass kettle and carried them outside and set them on the ground. When they were ready, the attendant returned to the longhouse and summoned the Faithkeepers, and the men and women, to come outside to stand around the priest. Twenty Pails, or Elijah David, sprinkling the sacred tobacco over the embers, prayed in the style already quoted. The Senecas believe that the smoke bears their message aloft to the Creator. The night air was redolent with the odor of burning tobacco. All the maples in the forest were witness to their prayer. The assembly listened with bowed heads and rapt attention.

When we went back inside the longhouse, the speaker announced the program of events which always comprises Thanks to the Maple: Bowl Game between the men and women and a series of social dances starting with the Pigeon Dance. In the Bowl Game the women play against the men: 25 beans are used to keep score and when one side has won all the beans, that side has also won the bets. The bets which have been collected the previous day in the community are taken home by the winners who carry with their winnings the obligation to sponsor a social dance in the fall for the losers. The same attitude of good-natured rivalry pervades the social dances which follow.

The Pigeon Dance belongs to the cycle of stomp dances, but it has more than social significance on this occasion, because both the maple and the passenger pigeon were harbingers of spring. In the Pigeon Dance, performers walk around counterclockwise, two men in the lead, each carrying a horn rattle; the first man is the principal singer and the second his assistant, and then men and women alternate on down the line. Customarily, one seeks a partner before entering a dance. A man asks another man, a lady asks another lady, and so on, and they enter as couples, the men and women interspersed on down the line until the whole

Seneca Sap Spile, Elm Bark Spoon and Pothook, New York State Museum Collections

assembly is included. A friendly feeling grows up between dance partners and it is considered bad manners to refuse.

Since Pigeon Dance text and music are reproduced elsewhere from recordings, we can only say that the song is one of the most pleasing which the Iroquois still sing. Its slow cadence could easily be learned by children; the dance is simple to perform, and the words have no meaning other than as nonsense vocables.

As in other Iroquois social dances when the song reaches the change before the repeat, the couples rotate and dance facing one another, the leader backstepping and his partner following until the song changes again, when he turns about and faces forward. This slow, wheeling, rotating sequence of the dance possibly resembles the passenger pigeon in flight, and the double column, which the dance sometimes assumes, represents the mass of the pigeons in migration.

It took me ten years to discover why the Pigeon Dance regularly leads off social dances at the Seneca Maple Festival. Pigeon time came soon after the maple harvest. The Senecas in honoring the pigeon on this occasion were anticipating the northward migration of the pigeons for which they would return thanks at the next stated festival, probably at planting time. It was at the Cornplanter grant in Warren county, Pennsylvania, just south of the New York line, that Willie Gordon, a veteran trapper and renowned bear hunter, told me about going after squabs to the beechwood groves south of Sheffield where passenger pigeons were last reported to be nesting. With this slim lead, it soon developed that others of the Senecas with whom I had worked also remembered the seasonal pigeon hunts of their ancestors and a few of the older people had actually participated when young. Evidently among the Senecas such trips to the pigeon roosts were regular events in the annual round of getting a living.

Since the passenger pigeon was one of the most abundant birds, if not the most abundant in North America, the Indians long depended upon its annual return to the nesting grounds where they procured the squabs in great numbers to supplement their diet; in fact, at this season of the year, it seems to have constituted the principal part of the food supply.

Accounts of pigeon hunting in New York State commence as early as 1639 for Albany and are regularly reported thereafter. Oneidas took squabs from nests with long poles in the time of Samuel Kirkland, founder of Hamilton College; and in Roots of Iroquoian Words (1670), by Father Jacob Bruyas, appears a term for a long pole for dislodging the nests of the pigeon, fairly convincing evidence that the Mohawks and Oneidas knew this method quite early. Among the Senecas, as soon as the squabs were ready to leave the nests, the nesting trees were felled and the fattened squabs were taken by hand.

No one missed the annual fun at the pigeon roosts if he could possibly get there. As soon as the cry came to the villages, " Now once again they are nesting," everyone young and old who was able to go packed up and started for the pigeon roosts. The Senecas were known to suspend serious business such as treaties when the pigeons arrived. On the 6th of May 1791, Red Jacket and Captain O'Beel came to Colonel Thomas Proctor, the federal representative at Buffalo Creek, to say " no council would be held this day, that it was their annual pigeon time, in which the Great Spirit had blessed them with an abundance; and

Courtesy of Portland (Maine) Society of Natural History

Passenger Pigeons, from a Painting by Louis Agassiz Fuertes

that such was his goodness to the Indians that he never failed sending them season after season, and that although it might seem a small matter to me, the Indians would never lose sight of those blessings. This is, therefore, the reason why our men, women and children are gone from their towns."

The Senecas, moreover, religiously remember their obligation to the Creator for the things which he annually sends them in abundance by returning thanks in season, and they also pray that this condition shall continue always. In the old days they did not trust to chance to conserve the supply of plants and animals on which they subsisted, but they took some regular precautions to insure their perpetuation. To this day, when they collect medicinal plants, tobacco is offered at the first plant of the desired species, which is then left to grow to seed for ensuing years. Deer were not taken at certain seasons; and the Senecas say that they did not molest pigeon hatcheries until the squabs were ready to leave the nests, while the older birds were allowed to go free. The albino pigeon figures prominently in Seneca mythology, was considered sacred and was never disturbed.

What is more, because of their community nesting habits the Senecas ascribed human qualities to the pigeons. It was customary when they took their young to levy among the hunters a collection of gifts such as silver brooches, wampum and other articles of apparel as an offering to propitiate the pigeons. These gifts were carried to the wood's edge beside the pigeon colony, where an elder set them down and kindled a little fire. On the embers of this fire he sprinkled sacred tobacco, as in the maple thanksgiving, and it is believed that the words of his invocation were carried aloft on the smoke to the Creator and to the spirit-forces of the pigeons, who were ordained to sustain the people living on the earth. His voice alone carried the entreaties of all the people, returning thanks that the pigeons had once more nested near their settlement.

Methods of taking the squabs and birds varied. Mature birds were shot with bows and arrows, and a blunt arrow, in addition to long poles, was used for driving squabs out of high nests. Nets were set to catch flights even before white trappers used nets extensively.

The hunt was nowhere nearly as organized as the buffalo hunts of the Plains

Indians, but hunting parties from each locality were sometimes in the charge of a leader or head man whom the families had appointed for the duration of the hunt. He was selected for qualities of leadership, character and ability to speak. It was his job to address the hunters each morning and night, to marshal the company on the road and to assign camping sites on arrival at the roosts. He would exhort the people to keep order and would conduct social dances and other festivities which inevitably take place when Seneca Indians gather together. The spirit of "Come on, you might as well go along and see this once before you die," pervaded these affairs.

They camped in lean-tos and at daybreak the people got up in response to their leader. The most common method of taking squabs in later days was to fell the roosting trees and pick up the squabs out of the bushes. They were killed by knocking them on the head with a stick, by pinching the heads at the temples between thumb and forefinger or by wringing their necks. Biting the head just back of the eyes was an approved method of killing the catch among professional hunters. The squabs were at once cropped and gutted and a little salt was put on them. They were packed in bark casks for transport home. The hunters lived principally on squabs that they had caught, which were boiled after the women had picked them clean of feathers.

In the literature on the extinction of this noble species, Indians blame Whites and Whites blame Indians, but the fact of the matter is that so long as there were scarcely 15,000 Indians in all New York State, the extremely numerous passenger pigeon was not threatened. That there was a balance in nature, the Indians knew and appreciated, and in it they sensed they played a part. It was only when several million Whites came to settle on these shores and turned seasonal activities of the Indians into trades and professions that the species soon diminished and then rapidly disappeared in a few years following 1880. It is certain therefore that the passenger pigeon's disappearance can not be attributed to natural enemies or to the Indians. Something happened to upset the balance of nature, and the professional white pigeon hunter was the principal culprit.

For the history of the passenger pigeon, see the *Journal of the Washington Academy of Sciences*, October 15, 1943, and A. W. Schorger, *The Passenger Pigeon: its natural history and extinction* (Univ. of Wisconsin Press, 1955).

Acknowledgment

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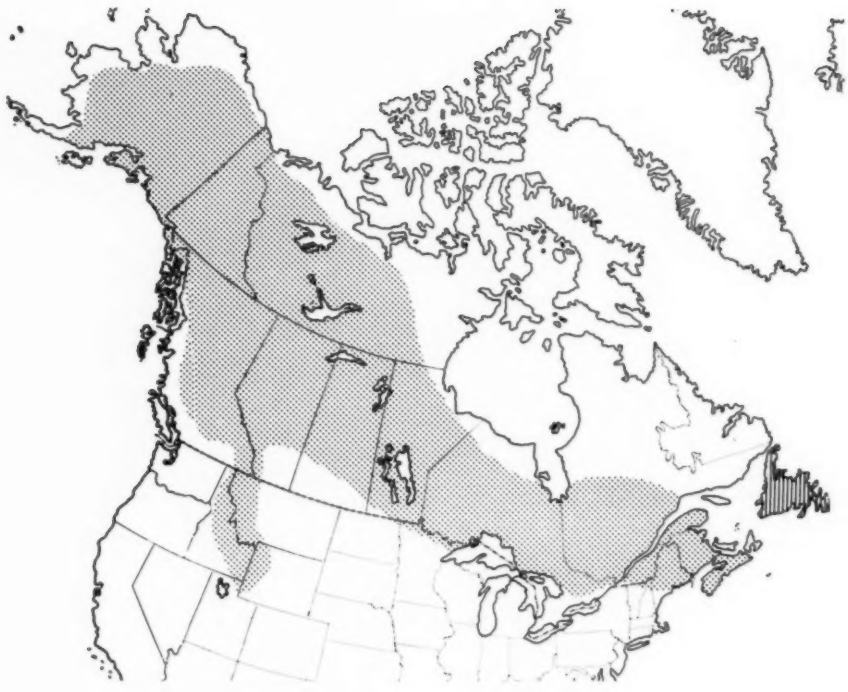

Approximate Present Range of Moose in North America

The area occupied by moose in the United States has decreased since colonial times. In New York, for example, the moose once was plentiful in the Adirondacks and occurred also in the Catskills. It has extended its range somewhat in northwestern Canada and Alaska in recent decades. In 1904 and 1906 it was introduced from New Brunswick into Newfoundland, where the 1953 reported kill was 1386 bulls and 931 cows. It did not become established when introduced on Anticosti Island in the lower Gulf of St Lawrence. (Introduced range shown by vertical pattern on map.)

The Moose, Our Largest Deer

THE MOOSE IS NOTABLE for its high shoulders, broad overhanging muzzle, a fold of skin or "bell" hanging from the throat and widely palmated antlers grown annually by the bull. Most of the animal is very dark, except for lower parts of the legs, which are light. In the East an exceptionally large bull might reach 1200 pounds, and rarely has one been killed having an antler spread of 65 inches; much larger bulls with greater antler spread have been killed in Alaska and northwestern Canada. A cow killed at Raquette lake in the Adirondacks in 1861 was estimated to weigh about 800 pounds, which is near average for a mature eastern female in good condition. The popular notion that the moose is a vocal creature does not apply to some of the eastern population or anywhere outside the fall rutting season.

The cow breeds first when two or three years old. Gestation requires approximately eight months and most calves are born in late spring. Her first birth usually yields a single calf; thereafter twins are the rule, and triplets have been reported. Calves at birth are rather pale reddish brown, the legs lighter, and they can walk in a few hours. They nurse until winter, or even longer, and by then have a dark coat. The cow cares for and vigorously defends her offspring.

Especially in the Northeast, moose have straggled regularly to points well outside the usual range of the species. These wanderers frequently enter settled areas, often are seen on roads and sometimes associate with domestic livestock. The wandering appears not to be a normal range extension by healthy animals. Often the stragglers are barren cows. Pictures of a number of them show a thin animal in poor coat. In recent decades there has been considerable study of moose encephalitis, which occurs in the population at least from the Maritime Provinces to Minnesota. One possible explanation why many moose are scrawny, seem half blind and have faulty nervous coordination is that a warming of the climate has so altered the plant life on which they feed that their present diet is deficient.

The moose's year-round mainstay is willow leaves and twigs. It eats many other plants; in summer it wades to feed on aquatic vegetation. Captives are known to eat 40 to 60 pounds of food daily, the larger ration in summer. The moose often does poorly, however, when confined in zoos. A feeding moose is rather amusing to watch. It chews very rapidly — more like some small rodent than a huge deer!

Moose in the Adirondacks had decreased by 1850 to the extent that killing one was a noteworthy event. At least one was killed in 1859, several in 1860 and three near Raquette lake in 1861. Supposedly these were the last of the native stock. Thereafter, several attempts were made to restock moose in the Adirondacks, the most notable being the release of 15 animals in 1902–3. They did not fare so well as liberated elk and vanished sooner. In late September 1950, a bull in good condition with a three-foot spread of antlers, was seen (and photographed on the 23d) near Troy, but it soon disappeared.

The moose's natural range includes northern parts of the Old World as well as the New; its biology is better known in Sweden than anywhere else. The few moose now on South Island, New Zealand, are descendants of Canadian stock liberated in 1900. In the United States the moose hardly can be considered a game animal any more in much of the area where it still occurs, but these huge animals have become a major tourist attraction in parks and elsewhere.

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